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MASSPORT'S PROGRAM FOR AIRPORT CAPACITY EFFICIENCY (PACE)

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MASSPORT'S

PROGRAM FOR AIRPORT

CAPACITY EFFICIENCY (PACE)

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PROGRAM FOR AIRPORT CAPACITY EFFICIENCY (PACE)

I

A. INTRODUCTION

By most measurements of on-time performance, Logan International Airport (Logan) is now experiencing unacceptably high levels of congestion and delay. A major cause for this phenomenon is that under particular wind and weather conditions the number of flight operations during peak hours exceeds the physical capacity of the airfield to handle them without serious delay.

The management of Logan's passenger carrying capacity will be impeded unless the economic subsidies that perpetuate operating inefficiencies are eliminated. The current landing fee structure at Logan subsidizes small aircraft operations. Massport, therefore, proposes to eliminate the subsidy by imposing a more uniform fee structure for all aircraft by allocating landing fees according to the actual cost of accommodating each aircraft operation at Logan. This action is prompted by Massport's desire

for a more equitable and accurate cost allocation program and is independent of the effect on delay resulting from elimination of the subsidy. It is Massport's belief, however, that while this initial step is not proposed as a solution to the delay problem, it will facilitate additional actions designed to reduce delay. Further, all aircraft currently may use Logan under similar conditions regardless of the number of passengers carried by each. As a result, aircraft operation demand during the peak hours of the day exceeds the reasonable capacity of Logan causing significant delay for thousands of passengers.

As proprietor and operator of Logan, Massport must manage the airport, responding to and planning for the impacts of increasing passenger demand for air transportation. Because of Logan's geographic and environmental constraints, Massport has endeavored to accommodate this demand through improved operational efficiency. For example, in order to efficiently manage groundside traffic at Logan, Massport has implemented a series of innovative and successful ground access programs that have reduced the number of vehicles using Logan's roadway system. Massport is currently planning for the Third Harbor Tunnel impacts, as well as for ways to reduce the anticipated demand on roadway and terminal facilities projected for the next twenty years.

It is now time to coordinate the groundside and terminal traffic control programs with a program designed to promote similar efficiency in the use of Logan's physical airfield facilities. In an era of ever-increasing demand for passenger services, Massport cannot stand idle while its most basic resource

-- the airfield -- is inefficiently utilized by an air fleet mix that impedes the reliable and efficient flow of passengers and that undercuts Massport's efforts to manage its terminal and roadway systems.

Over the past year, Massport has reviewed the causes and potential remedies for the present unacceptable delays and announced on August 27, 1987 a plan, now known as PACE (the Program for Airport Capacity Efficiency), to address delay and service problems. The PACE program consists of four major points:

First, a proposal to eliminate the current landing field subsidy for smaller airplanes by raising minimum landing fees to a level commensurate with the equitable allocation of airfield costs and a proposal to examine and discuss methods of allocating Logan's peak hour airfield capacity to maximize efficiency and reduce delay for the greatest number of passengers;

Second, a proposal to develop and issue a Logan Airport Passenger Bill of Rights providing information about traveller rights and appropriate procedures and information sources when dealing with lost baggage, missed or cancelled flights, over-bookings, and other service problems;

Third, a request that federal officials provide sufficient resources to develop and implement a plan that encourages use of regional airports and other transportation modes as effective alternatives to use of Logan. This will involve the provision of federal funds for those regional airports (such as Worcester, Massachusetts; Manchester, New Hampshire; Providence, Rhode Island; Portland, Maine and others) that already provide jet service and have the potential to provide increased service for passengers in their immediate market areas. It also will involve support for the development of a high speed rail corridor to provide a significant transportation alternative to the Boston-New York air route, which is the busiest in the nation; and

Fourth, a request for the prompt implementation by the Federal Aviation Administration (FAA) of urgently needed improvements to the air traffic control system nationwide, including the hiring of more air traffic controllers, the commercial development of a traffic alert and collision avoidance system (T-CAS), the development of regulations and procedures for the use of microwave landing systems, and other technical and personnel improvements.

With regard to the first point in the PACE program, Massport intends to raise the minimum landing fee, eliminating the current subsidy for small aircraft. Massport also has developed a conceptual framework for a peak hour pricing plan that will encourage the use of Logan by aircraft carrying the largest number of passengers during those peak hours when the number of operations is expected to exceed Logan's realistic capacity.

The specific items addressed in this memorandum and to when Massport solicits public comment are:

(1) A proposal to amend Section 21.24 of the Rules and Regulations for Logan by instituting a minimum landing fee of $91 applicable to all aircraft landings in addition to a modification of the annual weight-based fee structure, with an exemption from these fees available for those operations providing essential air service; (Massport is also interested in comments as to the possibility of adjusting this scheme further by imposing a reduced minimum landing fee of between $50 and $75 during off-peak periods with appropriate modifications to the weight-based fee.); and

(2) A conceptual framework for a peak hour pricing scheme for future consideration that would be based on the existing landing fee plus additional peak hour fees based upon priorities designed to maximize the passenger carrying capacity of the airport (Massport also solicits comments as to the desirability of creating the peak hour pricing scheme based upon departures as well as landings.).

This document is structured to facilitate an understanding of the current and prospective operating environments at Logan and the range of management actions that are required to maximize the passenger capacity of Logan within the current physical landing field capacity, so that interested parties may understand the problem and Massport's proposals for addressing the problem and so that parties have a sufficient understanding for submission of comments on the proposed actions.

Section I provides a general summary of the historic regulatory structure of the air transportation industry, as well as a description of the increased demand levels that form the basis for the delay problem resulting from Logan's limited airfield capacity.[1]

Section II describes how increased demand has absorbed Logan's airfield capacity (i.e. runways, taxiways) to such an extent that the frequency and duration of delay has increased to unacceptable levels.

Section III outlines a proposal that will establish a revised landing fee structure to allocate airfield costs more accurately and equitably. That proposal will be presented to Massport's Board of Members in January, 1988 for consideration.

Section IV describes the concept of a peak hour pricing program based on peak hour landing fees proposed for future implementation. This concept is being proposed for discussion purposes only at this time. It will not be submitted to the Massport Board of Members in January, 1988. Before recommending any such peak hour proposals for adoption by the Board of Members, Massport will undertake extensive discussions of these proposals

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[1]Delay has several causes in addition to the limited physical capacity of the airfield. It can result from airline operations and from the air traffic control system. These delay problems are beyond the control of Massport even though Massport in points 2 and 4 of the PACE program advocates measures to address them. This memorandum only addresses the setting of landing fees that are within the province of Massport, as the proprietor of Logan. The solutions proposed will reduce delay resulting from Logan's limited capacity; they will not effect other sources of delay.

with the U.S. Department of Transportation (DOT), the Federal Aviation Administration, representatives of the airline industry and interested citizens. Massport will have further public hearings before any proposal described in Part IV of this memorandum is brought to the Board for action.

Massport solicits specific comments related to the proposal in Section III and to the concepts discussed in Section IV, including any other alternatives that commenters may wish to offer to address the identified problem areas.

I

A. AIRLINE DEREGULATION

Prior to 1978, the air transportation industry was tightly regulated under the aegis of the Civil Aeronautics Board (CAB) with respect to air carrier economic activities such as routes, service levels and fares and by the FAA with respect to air carrier operating activities, aircraft, pilot and airport certification, and air traffic management. The CAB's principle function was to regulate competition through its authority to grant and restrict air carrier routes. This system was designed to provide a network of guaranteed inter-city air service. By virtue of the fact that the CAB's awards to operate in any given market were limited to a specific carrier or carriers, the system intentionally created effective monopolies or near-monopolies that priced the cost of the service (i.e., air fares) in order to cover operating costs and to maintain rather high levels of profitability on principal routes. In recognition of the importance of fostering the growth of the industry, such a system provided stability in service levels and in revenue. This type of stability, however, provided no competitive incentive to operate more efficiently by cutting costs and offering lower fares.

Beginning in 1977, the CAB, through the leadership of its Chairman, Alfred E. Kahn, implemented a new policy of "multiple and permissive" route awards -- i.e. all carriers that were deemed ready, willing, and able to serve a particular route were allowed to provide service within designated markets at levels and fares

determined by market forces rather than through the dictates of the CAB. This new approach was grounded on the assumption that:

(1) increased competition among air carriers within each route would lead to discounted fares that in turn would stimulate more passenger demand and maintain air carrier profitability for the more efficient operators; and

(2) achievement and maintenance of the operating efficiencies underlying this new scheme would eliminate any need for broad subsidies that artificially supported carrier inefficiencies.

These concepts were ultimately embraced by Congress through passage of the Airline Deregulation Act of 1978.

B. INCREASED DEMAND AS A RESULT OF DEREGULATION

The lower fares which resulted from increased competition in the newly deregulated airline industry provided an immediate stimulus to passenger demand. Across the United States, passenger demand has risen sharply in the years since 1976 (the year before the relaxation of CAB regulation) as is indicated in the following table:

TOTAL UNITED STATES
PASSENGER ENPLANEMENTS (x 1000)
(Based on ATA Annual Statistics)

YEAR	NUMBER OF PASSENGERS	INDEX (1976=100)
1976	223,318	100
1980	296,903	133
1984	344,683	154
1986	418,493	187

At Logan, the increases in total passenger enplanements since 1976 have been even greater than the national average:

TOTAL PASSENGERS
LOGAN AIRPORT

YEAR	NUMBER OF PASSENGERS	INDEX (1976=100)
1976	11,473,856	100
1980	14,850,425	129
1984	19,487,847	170
1987 (12 months ending June 1987)	23,057,733	201

As can be seen by reviewing the index set forth in the above tables (100 = 1976 passenger levels), the number of airline passengers in the United States has increased by eighty-seven percent from 1976. The increase in passengers is even more dramatic at Logan where the annual number of passengers has increased over 100 percent in that period of time. Furthermore, FAA projections for the future passenger levels at Logan indicate that passenger demand will grow to 25.4 million by 1990, 37 million by 2000 and 45 million by 2010 --- double today's passenger level.

The strains caused by increased passenger demand first became manifest on the roadways servicing the airport, in the roadways in the areas adjacent to Logan and in the terminals. After considerable market analysis and operational research, Massport implemented a comprehensive ground transportation program

including an increase in the availability of multi-passenger vehicles that serve Logan (i.e. express bus, water shuttle, etc.) and encouragement of use of mass transit. Massport is now experimenting with a commercial vehicle priority lane that allows multi-passenger vehicles better access to the Sumner Tunnel, the primary route from Logan to downtown Boston. The Authority also changed ground transportation rates to provide more management control over ground access to the airport. These efforts have resulted in a significant increase in the use of multi-passenger vehicles and have enabled the existing roadway system to more successfully accommodate increasing passenger traffic with as little impact on the adjacent roadways as is possible. Massport will continue its efforts to encourage use of multi-passenger vehicles and mass transit.

With respect to the Logan terminals, travelers have encountered long lines at ticket counters and baggage areas. Gate use has become more difficult to manage. There is greater congestion in the hold rooms. With respect to the terminals under direct Massport operating control, Massport has not only made physical improvements to accommodate increased passenger levels (e.g. Terminal C project) but has also sought the cooperation of the airlines in implementing improved passenger processing procedures (e.g. additional passenger information booths and company representatives in the terminals).

In order to more efficiently utilize the gates, Massport has implemented a new policy of granting air carrier tenants preferential gate-use rights rather than exclusive use rights for

all new terminal leases at Logan. The long-established industry practice of an air carrier tenant absolutely and exclusively controlling all of its leased premises, including gates, had resulted in uneven distribution of limited facilities to handle increased passenger flow. Preferential use rights now allow Massport to manage underutilized terminal facilities to accommodate additional demand.

Better management of the terminals and roadways may not be enough in light of currently projected demand. If Massport's terminal management efforts are not successful, significant capital expenditures also may be required. Massport, therefore, has begun to study the feasibility of changing the existing basic terminal passenger processing flow from a system of separate unit terminals accessible only through the single airport roadway loop to a single central passenger processing terminal connected to a variety of satellite terminals. The latter has the potential to better balance the use of the terminals and to encourage use of multi-passenger vehicles and mass transit by allowing a better connection betwen the ground access system and the passenger terminals.

The increasing passenger demand has now significantly affected the airfield because the number of aircraft seeking use of Logan exceeds Logan's capacity under certain weather and wind conditions in peak hours. Given the finite capacity of Logan's physical facilities (roadways, terminals, airfield) present and projected passenger demand will exhaust the airport's capacity unless immediate steps are taken to manage that capacity for maximum passenger carrying efficiency.

II

A. AIRFIELD CAPACITY

The capacity of an airfield has many variables. Logan's airfield has four major runways which can be used in up to 15 different configurations to accommodate air traffic. Each of these configurations has a different capacity to handle aircraft operations. Particular capacity configurations are not available in certain wind and weather conditions . Severe wind and weather conditions eliminate use of the highest capacity configurations. As weather conditions deteriorate as the result of reductions in cloud ceilings and visibility from those that permit operation under visual flight rules (VFR conditions) to those where instrument flight rules are in effect (IFR conditions), air traffic control rules require more time between each operation on the runway thus further reducing aircraft handling capacity beyond the reduction resulting from a runway use configuration.

Impaired operating conditions (IFR-1 conditions or worse) occur at Logan on average of one out of five days. Airfield capacity under IFR-1 conditions drops dramatically as compared to high visibility days (VFR). Under VFR conditions and under the highest capacity runway configurations, Logan can handle approximately 110 flights per hour. Under IFR-1 conditions, it can only process approximately 80 operations per hour; therefore, the capacity drops by 30 operations per hour on at least one out of five days. The maximum capacity during high visibility conditions is also reduced when wind (as opposed to ceiling)

conditions prohibit use of the high capacity runway configurations. Even though the capacity drops, the demand remains constant, causing an excess of operations beyond the capacity. For instance, the peak hour demand for Logan is 100 operations per hour; therefore, under IFR-1 conditions, there are 20 operations over Logan's capacity. These 20 operations are moved to the next hour causing delay in that hour. This pattern continues until the airport can finally accommodate these delayed operations at the end of the day.

A significant and often overlooked capacity variable is the capacity to carry passengers. The ability to accommodate passengers is based on the number of passengers on the aircraft that operate during any particular period. If the number of aircraft is at or above the capacity of an airfield, the passenger carrying capacity during that time will vary with the size of the aircraft. For example, if the airport can handle 80 operations per hour, the maximum passenger carrying capacity would be reached if all 80 operations were in B-747 aircraft. Put another way, the airport passenger capacity at such times is decreased by every less efficient aircraft that displaces a passenger carrying aircraft.

The passenger carrying variable is of paramount importance if Logan is to function effectively in processing the vast numbers of passengers using this vital facility without undue delay. When passengers are severely in convenienced due to significant delay, attempts must be made to reduce the number of operations to Logan's capacity and to encourage use of this capacity by larger passenger carrying aircraft.

Logan had the capacity to handle the increase in passengers for a period of time after deregulation. Many airlines increased their passenger-carrying efficiency by using larger aircraft rather than adding aircraft. For a significant period of time following deregulation, the number of aircraft operations at Logan actually declined despite the increase in the number of passengers. Since 1982, however, the number of aircraft operations has been steadily growing to the point where the operations capacity of Logan cannot handle more operations without significant additional delay during congested hours. Passengers that need access to Logan are being delayed during these times.

The number of operations at Logan in the summer currently averages 1300 each weekday, up 48% from 1982. Further, these operations have become bunched in the hours of peak passenger demand for access to Logan (7:00 - 9:00 a.m. and 4:00 - 6:00 p.m.). This peaking phenomenon is relatively recent and is becoming more pronounced. During today's peak hours, there are approximately 100 operations per hour. The existing peak hour demand profile is attached as Exhibit A. The FAA projects that the number of operations at Logan will increase by 25% by the year 2000. If the peaking pattern remains as it is today, the number of operations during these peak hours will reach large numbers that cannot be handled without significant delay. The projected peak hour demand profile for the year 2000, assuming today's peak hour pattern, is attached as Exhibit B.

B. UNACCEPTABLE DELAY

Logan cannot handle the existing number of operations in bad weather without unacceptable delay, particularly during peak

hours.[2] At the current peak hour demand, delay in IFR-1 conditions reaches almost 65 minutes per airplane. Under such conditions, the delay per airplane goes up to twenty minutes in the morning peak hour, drops to ten minutes during the midday peak hours and then surges to over sixty minutes per airplane during the afternoon peak hours. A chart depicting this delay pattern is attached as Exhibit C.[3] Based on this level of delay, almost 7000 passengers per hour (the number of passengers using Logan during peak hours) experience delay of up to sixty minutes each.

If nothing is done, the present delay problems will increase at a more dramatic rate than the increase in demand. If the number of operations increases by 30% (the growth projected by the FAA for the year 2000) and the existing peaking pattern continues, the present maximum delay will rise from 60 minutes per person in IFR-1 conditions to 100 minutes per person in 1990 and to 280 minutes per person in 2000. See Exhibit B.

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[2]The delay described in this section is attributable solely to the capacity limitations of Logan. Delay attributable to airline operating problems or the air traffic control system also occur periodically. Massport does not have accurate information on the non-Logan delay; therefore, it has not been compiled in this report.

[3]The charts depicting delay are based on a software model designed to measure aircraft delay, which was developed by Flight Transportation Associates at the Massachusetts Institute of Technology.

One method of handling the existing operations without significant delay is to flatten out the present peak hour pattern so that the highest number of operations per hour is less than the airport's capacity during bad weather conditions. For instance, if the present Logan peaking pattern were flattened out evenly throughout the day between 7:00 a.m. and 9:00 p.m., the number of operations would be approximately 80 per hour. At this number of operations, there would be no significant passenger delay as a result of airfield capacity in IFR-1 conditions .

However, even with continuous, non-peaked operations, there comes a point when delay once again reaches unacceptable levels. When the continuous operations demand exceeds the airport's capacity, delay rises at an extraordinary rate. Every operation scheduled above the capacity for a particular hour is passed on to the next hour causing a snowball effect that grows worse with each succeeding hour of demand.

For example, positing that Logan can handle 80 operations during IFR conditions for each hour throughout the day with per plane delay of less than fifteen minutes. If the number of continuous, non-peaked operations rises to 90 per hour, the delay per plane increases to almost 100 minutes per plane by the end of the day. At 100 operations per hour, delay increases to almost 220 minutes of delay. A chart depicting the delay pattern under these continuous operations is attached as Exhibit D.

The most conservative demand figures for Logan indicate that the number of passengers that will use Logan will double by the year 2010. The number of operations is projected by the FAA to

increase 30% by the year 2000. If these forecasts are correct and nothing is done to control the number of operations and if these operations are evenly distributed throughout the day, Logan will have 104 operations per hour with the resulting delay depicted on Exhibit D.

The delays associated with the demand described above have impacts beyond just the lost time associated with flight delay. When passengers are stacked up due to delay, the airport operations suffer. Aircraft taxi lines become longer causing more noise and air pollution. Ground traffic congestion at the curbs and on the roadways increases. The parking lots are filled; incoming passengers are late and outgoing passengers do not have a place to park. The groundside curb becomes chaotic as passengers converge at once trying to arrive at and leave Logan. The delay also pushes aircraft operations later into the night, raising nighttime noise levels. Passengers miss flights connecting at Logan.

C. CAPACITY EFFICIENCY

Massport is committed to support reasonable measures to reduce demand for use of Logan, including use of other regional airports and use of rail transportation to New York. It is not yet clear how much demand can be accommodated at other airports and by other modes of transportation. Measures must be taken when aircraft demand, despite Massport's best efforts, exceeds Logan's airfield capacity.

Expansion of the physical capacity at Logan is not the answer to Logan's capacity problem for a variety of reasons:

(1) The construction of additional runways will not eliminate capacity reductions caused by weather variations;

(2) The construction of new runways requires a lengthy planning and environmental review process that will be highly controversial and divisive;

(3) The construction of new runways will lead to unacceptable additional environmental impacts (given Logan's location in the heart of a densely populated urban area with long-established residential use patterns and given that Logan is surrounded by water on three sides); and

(4) The costs associated with such expansion are not justified, especially in view of the existence of administrative alternatives that could lead to similar capacity increases through more efficient utilization of existing resources.

The most appropriate solution is to manage the airfield's present passenger carrying capacity by adopting plans that flatten the number of operations at peak hours so that operations are at or below capacity throughout the day and increase the number of passengers carried per operation. The current passenger carrying capacity of Logan, particularly in peak hours, is determined by the type of aircraft using Logan.

Logan has the smallest average aircraft size of the 10 busiest airports that the FAA has identified as operating above capacity. The composition of the aircraft fleet using Logan in each hour of an average day is attached as Exhibit E. Air carriers conduct approximately 60% of all aircraft operations at Logan, yet these operations serve 94% of passengers using Logan. Air carriers use jet aircraft, which on average can accommodate up to 165 passengers but range from 75 to 400 seats per jet.

Commuter airlines conduct approximately 30% of the total operations and 40% of operations during peak periods. These flights carry only 5% of the total passengers. The average

commuter aircraft size at Logan is between 20 and 25 seats. Certain commuter airline operators use aircraft in the range of 50 seats, while others conduct all operations in aircraft with 19 or fewer seats.

A recent review of Logan's commuter airline service, performed for Massport by Simat, Helliesen, and Eichner, Inc, a leading aviation consultant, demonstrates that Logan's commuter markets are served by an unnecessarily large number of flights in aircraft with an unusually small number of seats per plane. Logan has over 15 commuter markets that each generates in excess of 14 operations per day at Logan. These markets are served by commuter aircraft that are considerably smaller than commuter aircraft used in similar markets. A survey of 50 comparable market patterns at other major airports demonstrated that Logan's commuter aircraft were over 20 percent less productive in terms of passenger seats than those at the other comparable airports. If Logan's commuter flights were conducted in aircraft similar in size to those of other congested airports, the number of overall aircraft operations at Logan would immediately be reduced by 10%. A ten percent reduction would significantly reduce delay at Logan.

General aviation operations constitute, on an average day, approximately 10% of the total operations at Logan while serving less than 1% of its passengers. Of these flights, approximately 40% are conducted over distances of less than 150 miles from Logan. Further, the majority of these flights originate from (or are destined to) points that have scheduled airline service to Logan. A recent Massport survey of these flights identified

Augusta, Waterville, Portland, Bangor, Burlington, Manchester, Lanconia, Bridgeport, Hyannis, Nantucket, Martha's Vineyard, JFK, Islip, Westchester, and Philadelphia as points that were major sources of both scheduled service and frequent general aviation flights to Logan.

Logan's capacity could be increased and its delays substantially reduced with almost no reduction in the number of passengers using Logan in these periods by moving smaller aircraft from the peak periods . For example, if the present peak period operations of 100 operations per hour were reduced to 80 operations per hour by eliminating the smallest aircraft (those with 20 or fewer seats) from the peak period, the duration of delay would decrease by 80% thereby reducing delay by 50 minutes each for 7000 passengers. On the other hand, only 100 passengers would be moved from the peak hour. These 100 passengers could be accommodated in the non-peak hours. Stated another way, if the smaller planes were moved out of the peak hour, 98% of the passengers using Logan during a peak hour would have delays cut by over 50 minutes each and less than 2% would suffer the inconvenience of using Logan before or after the peak hour. A chart setting forth these facts is attached as Exhibit F.

Of course, in the future, as the rate of operations per hour continues to increase throughout the day due to increased demand, the need for measures to manage operations and to reduce delay will become even more compelling. The same remedy would seem to apply. When operations exceed the capacity to handle flights without substantial delay, an airport operator must look to methods that encourage larger aircraft in order to achieve maximum passenger throughput and minimum passenger delay.

III

A. INTRODUCTION

Massport is proposing to eliminate the current subsidy for smaller aircraft by modifying its existing landing fee structure to more closely reflect the actual costs per operation for all aircraft landing at Logan. The current fee provides a 1.2 million dollar subsidy for general aviation aircraft and a 3.8 million dollar subsidy for commuter aircraft.

Historically, Massport has calculated its landing fee based primarily upon the weight of the aircraft, which allocates the greater share of the costs of the landing field to the larger commercial jet aircraft and results in a disproportionately low fee for smaller aircraft. Today, the majority of the landing field costs are attributable less to the weight of the operating aircraft than to the fixed cost of operations; therefore, the historic landed weight allocation is unfair and distorts the use of Logan by not assessing costs accurately.[4]

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[4]Certain non-regulatory actions are also under consideration relating to the pricing of facilities provided for the benefit of general aviation aircraft. In particular, Massport is considering the assessment of a $65 fee for use of the general aviation terminal in order to recover the costs of the terminal. In its review of the costs assessed general aviation operations, Massport found that general aviation activity is not only subsidized in the landing fee but is also subsidized by not charging terminal rent for use of the general aviation terminal. Currently, the annual terminal costs are $1,700,000. The $65 fee would fully compensate Massport for these costs.

B. CURRENT LANDING FEE

The current Logan landing fee is compensatory; it is designed to recover the costs for the landing field. Massport annually projects the costs of the landing field for the coming fiscal year estimating the number and weight of the aircraft operating at Logan projected over that fiscal year and then sets a charge per thousand pounds of maximum gross certificated take-off weight. Every plane landing at Logan must then pay a fee per thousand pounds of gross aircraft weight each time it lands. The current landing fee is $1.31 per thousand pounds of gross landing field weight. The weight based fee was the historic means of allocating landing field costs when runways were expanded to accommodate jet aircraft. Jets required larger runways; therefore, airports charged fees that disproportionately allocated the costs of the new runways to the jets. This logic no longer applies to Logan because the costs of the longer runways have already been substantially paid for by the jets users over the years. The costs now more closely reflect a cost per operation rather than the cost per landed weight. In many ways, the landing of small aircraft with just a few passengers on board uses the same resources as the larger aircraft serving nearly 400 passengers, yet the plane with 400 passengers pays over 30 times what the smaller aircraft pays under the present minimum landing fee.

Under a pure landed weight allocation, a small general aviation or commuter airline aircraft would pay less than $10 per landing, an average commuter aircraft would pay $23 per landing. In order to mitigate this disproportionately low fee, Massport

adopted a minimum landing fee of $25 so that any aircraft using Logan would pay $25 at a minimum regardless of the aircraft's landed weight. This minimum is not large enough to accurately allocate the landing field costs.

C. ACCURATE ALLOCATION OF COSTS

In order to determine more precisely the cost attributable to each aircraft landing at Logan, Massport calculated the actual costs of constructing, maintaining and operating the landing field and then determined the percentage of costs that are attributable to operations and the percentage of costs that are attributable to landed weight. The method that was used to calculate these costs is set forth in Exhibit G. This calculation demonstrates that approximately 35% of the current Logan landing field costs are related to the weight of the aircraft and 65% of the costs are related to the number of operations; therefore, a landing fee designed to allocate costs accurately between costs per operation and costs by landed weight would result in a fee for fiscal year 1988 of $91 per landing plus a weight-based fee of $.45 per thousand pounds of aircraft weight. (See Section III, E below)

D. OPERATIONS WITHOUT SUBSIDY

If the landing fee is revised to provide uniformity among airfield users, it is anticipated that there will be some change in aircraft operations at Logan. The following are the conclusions of Massport's analysis of these effects:

(1) Among the jet carriers which conduct roughly 60% of the operations and serve 94% of the passengers:

Those with smaller jet aircraft would see some cost increases compared to the current charges. Those carriers which operate larger aircraft that carry a greater number of passengers would realize a significant decline in costs. All evidence, therefore, suggests that the net impact of such a fee structure would be negligible and would not cause any change in jet carrier decisions about activity at Logan. In addition, since these larger aircraft would generally be the quieter Stage 3 aircraft, the combined fee would complement Massport's existing noise abatement efforts.

(2) Among the commuter airlines which conduct over 30% of the operations and serve roughly 5% of the passengers:

Larger increases in the cost to the commuter airlines would be seen by those airlines that operate the smallest aircraft. The commuter carriers would have a number of options for absorbing or transferring the increased costs:

- increase the use of larger commuter aircraft thereby reducing the number of operations at Logan;

- distribute the cost over all of the flights operated by the carrier in order to reduce the marginal cost of the smaller planes;

- push the costs up to their related major carrier via joint fare or cross-subsidy arrangements;

- eliminate the least productive of their flights; and/or

- transfer the cost to the passengers via fare increases (roughly $2.00 per passenger for an average aircraft);

(3) Among general aviation users which conduct 10% of the operations and serve less than 1% of the passengers:

40% of the general aviation operations at Logan are conducted to/from airports which are less than 150 miles distant from Logan, from most of which scheduled air service to Logan is provided. The majority of general aviation flights are conducted in the smallest general aviation aircraft. The conversion of the fees to the rates outlined above

would likely cause a portion of these flights to be eliminated. About 7% of these flights would be expected to use the variety of outlying airports that are proximate to Boston.

Nearly 60% of the general aviation flights are corporate aircraft (of the jet or large turboprop type) thirty percent of these flights fly more than 500 miles to arrive at Logan. It is expected that a non-subsidized fee on these aircraft will not cause any changes in the decision to operate at Logan.

Generally, the cost increases for commuter operations as a result of the proposed subsidy elimination will vary depending on the size of the aircraft, with the smaller aircraft bearing the greatest increase. The projected fare increase for commuter aircraft would be between 5 and 6 percent for the commuter operations that do not convert to larger aircraft and that pass on all of the landing fee to the passenger. The projected fare increases by market and by aircraft are set forth in Exhibit H.

Past experience indicates that the proposed minimum fee will not eliminate commuter service. In June 1980, Massport adopted a minimum daily use fee for all airport users. The fee was adopted after a cost allocation study indicated that a minimum fee of no less than $81 and potentially up to $107 (1980 dollars) was appropriate. After receiving public comment, the minimum daily use fee was set at $50 in order to address the distorted lower end of the weight-based payment scale.

In response to the requests of general aviation users, this fee was later discounted to $20 in off-peak periods. The effect of the imposition of this fee was that only the smallest general aviation aircraft of the single engine type were discouraged from using Logan in busy hours; commuter flights were not affected.

The general aviation flights were apparently discontinued. There was no evidence to indicate that they used other airports. Because it was structured as a daily charge, this fee had no effect on commuter carriers with multiple daily operations. These results were consistent with those projected by Massport prior to the institution of the fees. This fee was rescinded in August 1982.

In October 1984, Massport adopted a minimum fee per landing of $25. As a result, any aircraft landing at Logan weighing less than 19,000 pounds (roughly 15 seats) must pay the $25 minimum rather than the weight based fee. During the public hearing and in meetings with Massport, commuter airline operators claimed, among other things, that such a fee would cause the elimination of air service to certain communities. Massport responded to this concern of commuter airlines by instituting a minimum landing fee exemption program for markets providing essential air service. Over 7,800 commuter airline landings from origination points such as Lebanon, Keene, Augusta, Bar Harbor, Rockland, Waterville, Lewiston and Worcester have been exempted from the minimum fee as a result of this exemption program.

Massport proposes to maintain the current criteria for exemption from the minimum landing fee regardless of which of the landing fee options set forth below are adopted. Under either option, the minimum fee could be waived, and the exempted carrier would have to pay only the weight-based portion of the current landing fee of $1.31 per thousand pounds. The retention of the $1.31 weight-based fee for these operations without the imposition

of a minimum fee component ensures that these operations will continue to pay at current levels, subject to normal annual adjustment. Such an exemption program must be carefully balanced so that it does not distort use of the airport and increase congestion. For instance, it may be appropriate only to permit exemptions in off-peak hours. Persons interested in the continuation of such an exemption are encouraged to provide comments on whether or not such an exemption program during peak hours will unduly affect delay.

E. LANDING FEE PROPOSAL

Massport's analysis concludes that the accurate figure for the minimum landing is $91 per landing. In order to accurately allocate landing field costs, this fee should be set at $91 for every hour of the day. Massport is proposing to eliminate the small aircraft subsidy for all hours of the day. Some airport users, however, have asked Massport to consider reducing the $91 minimum landing fee in non-peak hours.

Massport, therefore, is proposing to amend its landing fee structure by enacting either one of the following alternative revisions to Section 21.24 of the Airport Rules and Regulations:

(1) to provide for the assessment of a minimum fee of $91 for each fixed wing aircraft that lands at Logan International Airport in addition to the established landed weight fee as annually adjusted by the Authority. (The weight based component under this alternative will be modified from $1.31 to $.45 per thousand pounds of gross certificated landing weight); or

(2) to provide for the assessment of a minimum fee of $91 for each fixed wing aircraft that lands at Logan between the hours of 7:00 A.M. and 9:00 A.M. and between the hours of 4:00 P.M. and 6:00 P.M. and a minimum fee of $50 for each fixed wing aircraft that lands at Logan International Airport at all other

hours, in addition to the landed weight fee as annually adjusted by the Authority. (The weight-based fee under this alternative will be adjusted from $1.31 to $.72 per thousand pounds.)

Persons interested in the second alternative (paragraph (2) above) should comment on why a fee different in non-peak hours than in peak hours is appropriate and whether or not such a fee would be an inappropriate subsidy. In addition, Massport is aware of the general concerns expressed by the FAA in other contexts that such fee differentials based on time of day may have effects on the management of air traffic. These concerns were based on the perception that some operations would elect to extend in flight operations arriving near the expiration of the peak period in order to take advantage of the lower non-peak fees. Although this type of behavior did not appear to occur when Massport reduced the minimum daily use fee during off-peak hours in 1980 (see discussion at p. 23), we solicit comment from the FAA and others as to whether the off-peak reduced fee alternative is viable.

The combined minimum landing fee and landed weight fee is different from the operation of the existing minimum landing fee. Under the existing system, each aircraft is charged the higher of the minimum landing fee or the landed weight fee. Under the proposed fee, each aircraft is charged the minimum landing fee plus the landed weight fee. This proposed landing fee structure will accurately allocate costs to every class of aircraft. The subsidy under the current system will be eliminated with the cost savings being directed to the larger aircraft. The savings for larger aircraft will increase with the size of the aircraft.

IV

A. DELAY WITH DESPITE ACCURATE LANDING FEES

Elimination of the present subsidy for smaller aircraft should reduce the delay now experienced at Logan. Massport projects that the proposed minimum landing fees will reduce overall Logan operations by 5% and that this 5% will come exclusively from non-jet general aviation traffic; it will not come from commuter operations. A chart depicting the projected impact is attached as Exhibit L. Assuming that the 5% reduction obtains evenly throughout the day,[5] delay at the peak hours with the greatest amount of delay will be reduced by over 20 minutes per operation. A chart describing the impact on delay of a 5% reduction in operations is attached as Exhibit M.

Even with accurately allocated fees, there remains a significant delay problem that will become worse over time. Assuming a 5% reduction, delay with today's peaking pattern will reach 40 minutes per plane during the afternoon peak hour. Further, the accurate fee structure will not significantly reduce projected demand for operations; therefore, as is described in Part II above, the delay will become progressively worse in the future.

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[5]As is discussed in Part III above, Massport is considering two alternatives for landing fees. Should Massport choose the second alternative with a reduced minimum landing fee in non-peak hours, such a fee may cause disproportionate reductions in operations as compared to the present level of operations.

B. DELAY SOLUTION

In order to reduce present and projected delay, the Logan landing fees can be adjusted to encourage airport users to keep the number of operations per hour at or below the number of operations that Logan can handle without experiencing significant delay. In a proposal to address delay related to capacity, that number of operations must be determined and should approximate that level of operations which can be handled during IFR-1 conditions. Since IFR-1 conditions or worse are in effect at Logan 20% of the time, a level substantially above the number that can be handled under IFR-1 conditions would doom Logan passengers to substantial delay on 20% of their flights. Massport expects to meet with federal officials to review how they have determined the correct capacity number at other airports in order to determine the appropriate number for Logan. For convenience, this number is referred to below as "practical capacity".

Once the practical capacity of Logan is determined, one must turn to those periods when it is anticipated that operations will exceed the practical capacity (peak hours). In those peak hours, steps should be taken to reduce the number of operations to the practical capacity. The number of operations during these periods can be reduced by encouraging some flights to move out of the peak hours into the non-peak hours, thus flattening out the demand, and by encouraging operations in larger aircraft with fewer flights in those commuter markets that are served by frequent flights in unusually small aircraft. Assuming that the Logan commuter operations are conducted in aircraft that are the same size as

those in similar markets, there would be approximately a 10% reduction in Logan operations. Such a reduction in addition to the 5% reduction would reduce delay dramatically. Massport is considering peak hour pricing plans that will encourage users of Logan to take actions that will flatten the demand pattern and that will encourage the most efficient passenger carrying operations in the peak hours.

C. PEAK HOUR PRICING SCHEMES

1. Across-the-Board Peak Hour Fees

Massport hopes to receive comments on two peak hour fee concepts. The first concept is the imposition of a flat peak hour fee on every aircraft that uses Logan during the peak hours. As an example, Massport could set a peak hour fee of $300 for every aircraft using Logan from 7:00 a.m. - 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. Under such a proposal, the peak hour fee would be assessed on every landing during these peak hours.

This peak hour landing fee would be operated within the context of a compensatory landing fee scheme; therefore, the landed weight component of the landing fee and the non-peak landing fee would be reduced so that Massport collected only the amount of revenues necessary to operate the landing field. As an example, if the minimum landing was set at $300 during peak hours (plus weight based fee), the minimum landing could be eliminated leaving only a landed weight fee of $.45 per thousand pounds.

An across the board peak hour fee, if set at the appropriate level, would probably encourage movement to non-peak hours by operations that could not operate at such a high fee. It is not

clear, however, how airlines would react to such a fee. For instance, would they absorb the cost of peak hour operations throughout the day and, therefore, not be affected at all by this peak hour system?

The largest concern with an across-the-board peak hour fee is that it would add significant costs for all peak hour operations whether or not they would change their operations as a result of the fee. These costs presumably would be passed on to the airline passengers thus raising prices, an undesirable result.

2. Priority Peak Hour Fee

A refinement to the across-the-board peak hour fee is that peak hour fees would be charged only to aircraft that do not meet the priority for carrying the largest number of passengers possible. This plan is a variant of peak hour pricing designed to encourage the use of Logan during peak hours by aircraft carrying the most passengers but not charging that fee to all users regardless of priority. An appendix that describes in detail how this peak hour priority strategy would operate is attached as Exhibit M.

Under this priority peak hour fee system, Massport first would set an allocation threshold, which would be the percentage of practical capacity available for priority aircraft. In order to allow as many larger aircraft operations as possible, the threshold would be set as close to the practical capacity as possible, with a percentage of operations below the threshold to be allocated according to an auction for non-priority aircraft and for a limited number of essential service operations. The auction

would be provided to allow some peak hour operations in non-priority aircraft. The exemption would allow some essential service during peak hours. Any aircraft that is not within the priority or exempt groups would be assessed a peak hour fee that would be larger than the auction price for that hour.

All aircraft using Logan would be divided into eight aircraft size groups according to aircraft size. These groups would be ranked from one through eight with the largest group designated the number one priority group.

After setting the allocation threshold, the number of aircraft in each aircraft size group would be determined. All of the operations in the largest aircraft size group would be granted a priority in the priority access allocation. The next group would be added in and so on until the number of operations within the priority aircraft size groups reaches the threshold number (the practical capacity minus the auction and exempted operations). Once the aircraft size groups were granted priority for a particular hour, any aircraft seeking to use Logan during that hour that is of sufficient size and that would have been within one of the priority aircraft size groups had the aircraft been scheduled, would be allowed to use Logan without paying a peak hour fee in addition to the regular landing fee, whether or not the aircraft had been scheduled for that hour.

Massport would auction a designated number of operations within the priority threshold. Successful bidders would be assigned a priority and would be required to pay the auction price plus the regular landing fee. The proceeds from the auction would

be credited to Logan's overall landing fee and airfield cost recovery system. Massport does not expect the auction proceeds to be large because the bidders competing for the reservations below the threshold will be small aircraft operations that could not economically absorb large auction prices. Further, the operations below the threshold would have two options in addition to bidding for the reservations. They could be rescheduled to the adjacent non-peak hours or they could be changed to be operated in an aircraft in one of the size classes that had been granted a priority reservation.

Operations within the priority aircraft size groups would be free to operate as under present rules. Airlines, therefore, would be free to make schedule changes among aircraft that qualify for a priority. If extra sections or charter flights are conducted in priority aircraft groups, they may conduct the operation as if they had a priority even though the originally scheduled aircraft was not within the priority group. Airlines may also consolidate flights from points that could be merged together into airplanes that have a priority for access to Logan in the peak hours.

Massport is also considering plans to incorporate into the priority peak hour fee system an exemption program for certain essential air service. In order to accommodate such service, Massport would set aside a certain number of operations from the practical capacity. These operations would be granted priority regardless of the size of the aircraft providing the essential service. Persons interested in the creation of such an exemption

program are urged to comment on whether the retention of such an exemption will negate the benefits in improving congestion and concomitant delay in the congested peak hours.

D. CONCLUSIONS

Of these peak hour options, Massport currently prefers the priority peak hour fee system. As is demonstrated in Part II, elimination of small aircraft during the hours when the number of operations exceeds capacity substantially reduces delay. The priority reservation system would affect only those operations that are inefficiently absorbing Logan's capacity; larger aircraft would be unaffected. If this plan were put into effect now, it would only effect the peak hour operations of general aviation and very small commuter aircraft.

Management of capacity by adjusting airfield fees is not an infringement on the FAA jurisdiction to manage the air traffic control system. Should the FAA determine that the air traffic control system cannot handle the flow of aircraft, it may impose a slot system or other mechanisms to control air traffic independent of any of the plans described above. The programs described here are an essential management tool of an airport proprietor to maximize the efficient use of its airport; they do not interfere with the responsibilities of the FAA.

The peak hour fee programs described above deliberately avoid the grandfathering that the FAA has adopted in imposing slots at high density airports. In implementing the high density rules, the FAA granted general aviation and commuter operations a number of slots equivalent to the number of operations existing at the

time the slot systems were imposed. As can be seen in Part II above, perpetuation of the same percentage of general aviation and commuter operations reduces an airport's passenger carrying capacity when the demand for operations exceeds an airport's capacity.

Finally, Massport believes that the proposed peak hour priority system is consistent with Massport's environmental obligations. Residents of the communities directly effected by noise generated from aircraft operations will be concerned about any proposal designed to make Logan more efficient in terms of its ability to handle larger aircraft. Such legitimate concerns are grounded upon the same cause underlying the need for the peak hour proposals -- i.e., the extraordinary growth in passenger demand that has ultimately led to an increase in jet operations at Logan.

The initial trend of air carriers at Logan in the early years of deregulation was to accommodate increased passenger demand through use of larger (and in many cases quieter) aircraft, with the result that cumulative noise impacts did not grow as rapidly as passenger demand. Because of concern both over the fact that air carriers had exhausted their ability to adjust their fleet mixes to continue this trend and over projections which indicated that future growth would continue at significant rates, Massport acted to address environmental concerns through the initiation of a formal rulemaking proceeding in November, 1985. This proceeding resulted in the adoption of comprehensive, innovative, stringent regulations designed to control cumulative noise impacts from aircraft operations.

The essence of these regulations is a commitment that cumulative noise impacts will not increase from 1984 levels. This commitment is reinforced by automatic regulatory adjustment mechanisms in various indices affecting the operating fleet mix at Logan. Faced with the prospect that more operations were likely to occur, to accommodate projected growth the regulations either require use of a quieter fleet mix overall or, upon failure of an air carrier to meet the required fleet mix indices, impose a prohibition on growth in operations by that air carrier. Thus, before acting to improve Logan's capacity to handle larger aircraft without excessive delay, Massport believed that it was necessary to ensure that such action did not exacerbate an already difficult environmental situation. This prioritization is an important confirmation of Massport's commitment to address environmental issues directly and aggressively.

Attachments

December 11, 1987

0433L

TABLE OF EXHIBITS

A. Current Logan Airport Demand Profile

B. Future Logan Airport Forecasted Operations and Delay

C. Current IFR-1 Delay for Logan

D. IFR-1 Delay with Continuous Demand

E. Logan Hourly Fleet Composition

F. Operations Reduction Impact

G. Cost Allocation Methodology

H. Potential Fare Adjustments by Market

I. Proposed Regulations

J. Landing Fee Structure Comparison

K. Potential Reductions in General Aviation Operations

L. Potential Delay Reductions at Logan

M. Description of Priority Peak Fee Plan

EXISTING DEMAND PROFILE: LOGAN AIRPORT

AVERAGE SUMMER WEEKDAY

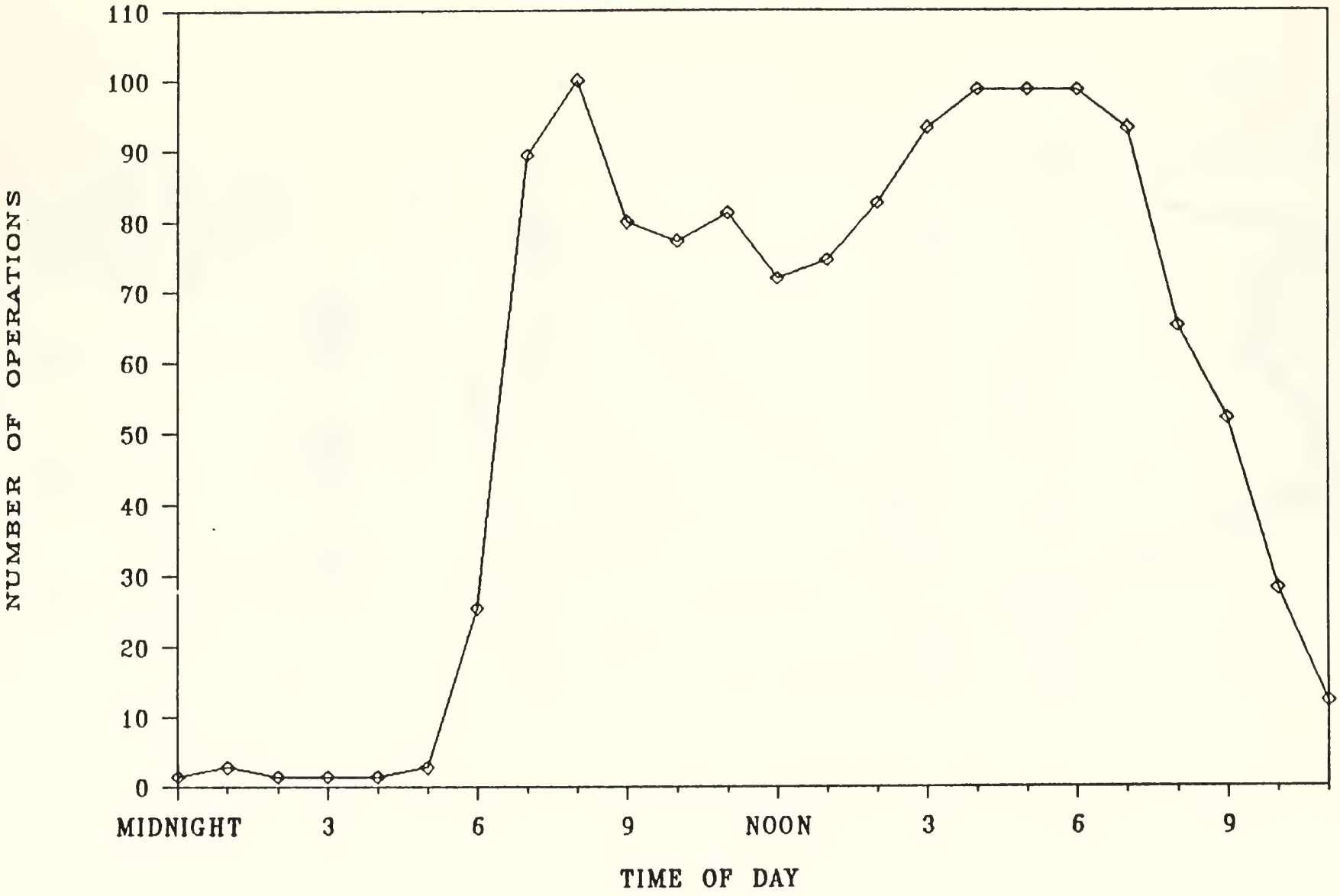
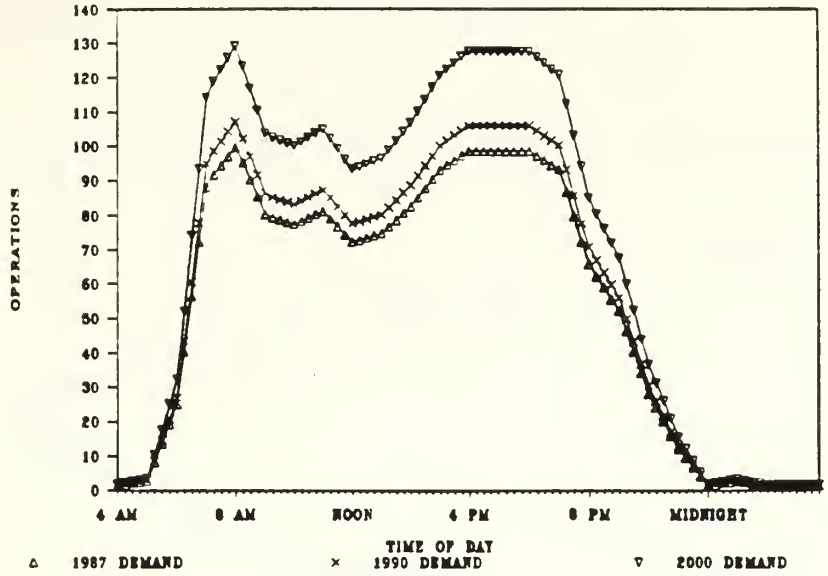


EXHIBIT A

EXHIBIT B

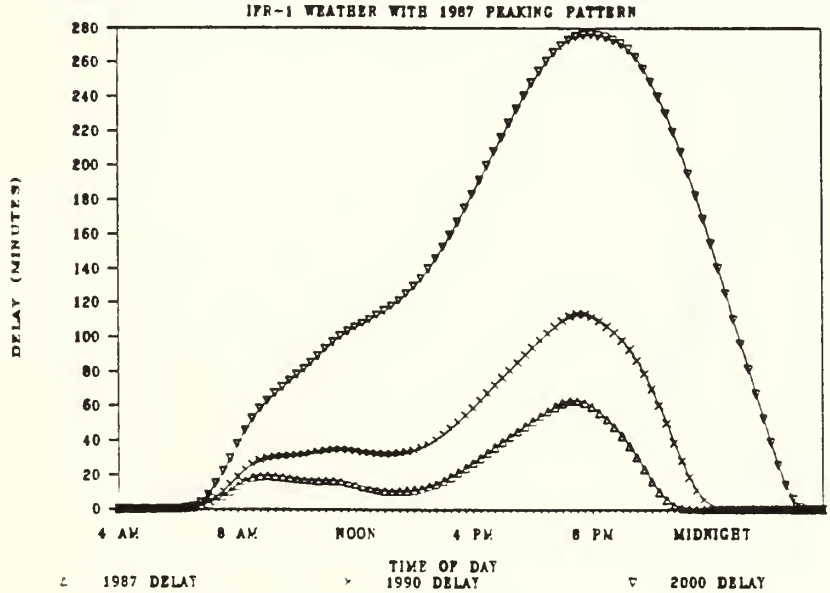
FAA OPERATIONS DEMAND FORECAST BY HOUR

WITH 1987 PEAKING PATTERN



DELAYS FROM PROJECTED OPERATIONS LEVELS

IFR-1 WEATHER WITH 1987 PEAKING PATTERN



COMPARISON OF DELAYS IN IFR-1 WEATHER:

	CURRENT OPERATIONS AND CURRENT PEAKS (MINUTES)	OPERATIONS IN 1990* WITH CURRENT PEAKS (MINUTES)	OPERATIONS IN 2000* WITH CURRENT PEAKS (MINUTES)
TOTAL DELAY THROUGHOUT DAY	34,204	74,318	252,843
AVERAGE DELAY PER AIRCRAFT	26	52	147 (2 HRS 27 MIN)
DELAY EXPERIENCED BY MOST DELAYED AIRCRAFT	64	114	276 (4 HRS 36 MIN)
PERCENT OF TOTAL AIRCRAFT DELAYED MORE THAN:			
5 MINUTES	81%	92%	95%
10 MINUTES	69%	87%	94%
15 MINUTES	58%	82%	92%
20 MINUTES	50%	78%	91%

NOTE: DELAY FIGURES INCLUDED ALL AIRCRAFT TAKING OFF OR LANDING IN AN AVERAGE SUMMER WEEKDAY. IFR-1 WEATHERIS ASSUMED TO LAST THROUGHOUT ENTIRE DAY.

*PROJECTIONS FROM FAA AVIATION FORECASTS

DELAYS FOR IFR1 WEATHER: LOGAN AIRPORT

AVERAGE SUMMER DAY

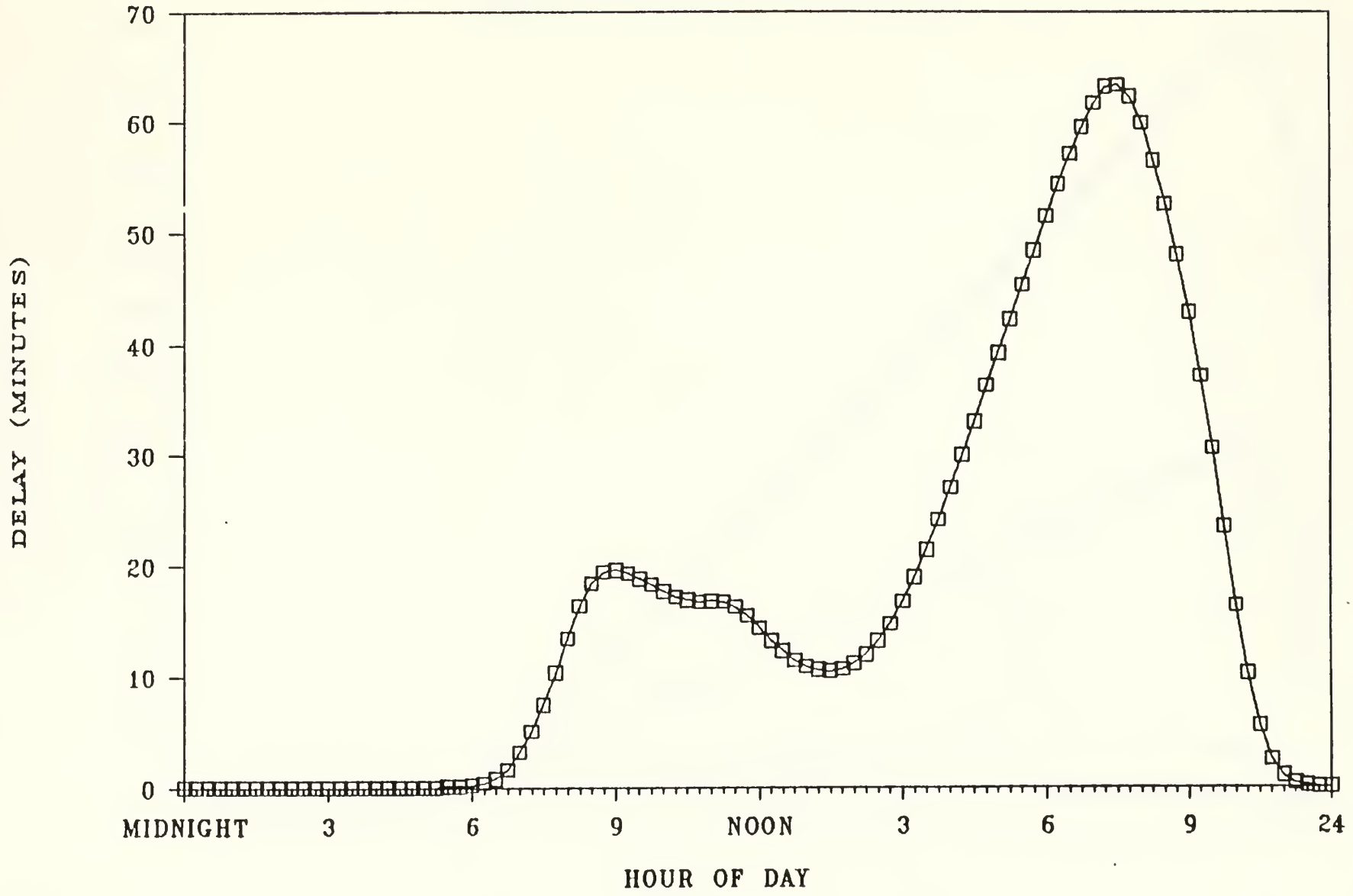


EXHIBIT C

IFR1 DELAY WITH CONTINUOUS DEMAND

DEMAND = 70, 80, 90 & 100 OPS/HR

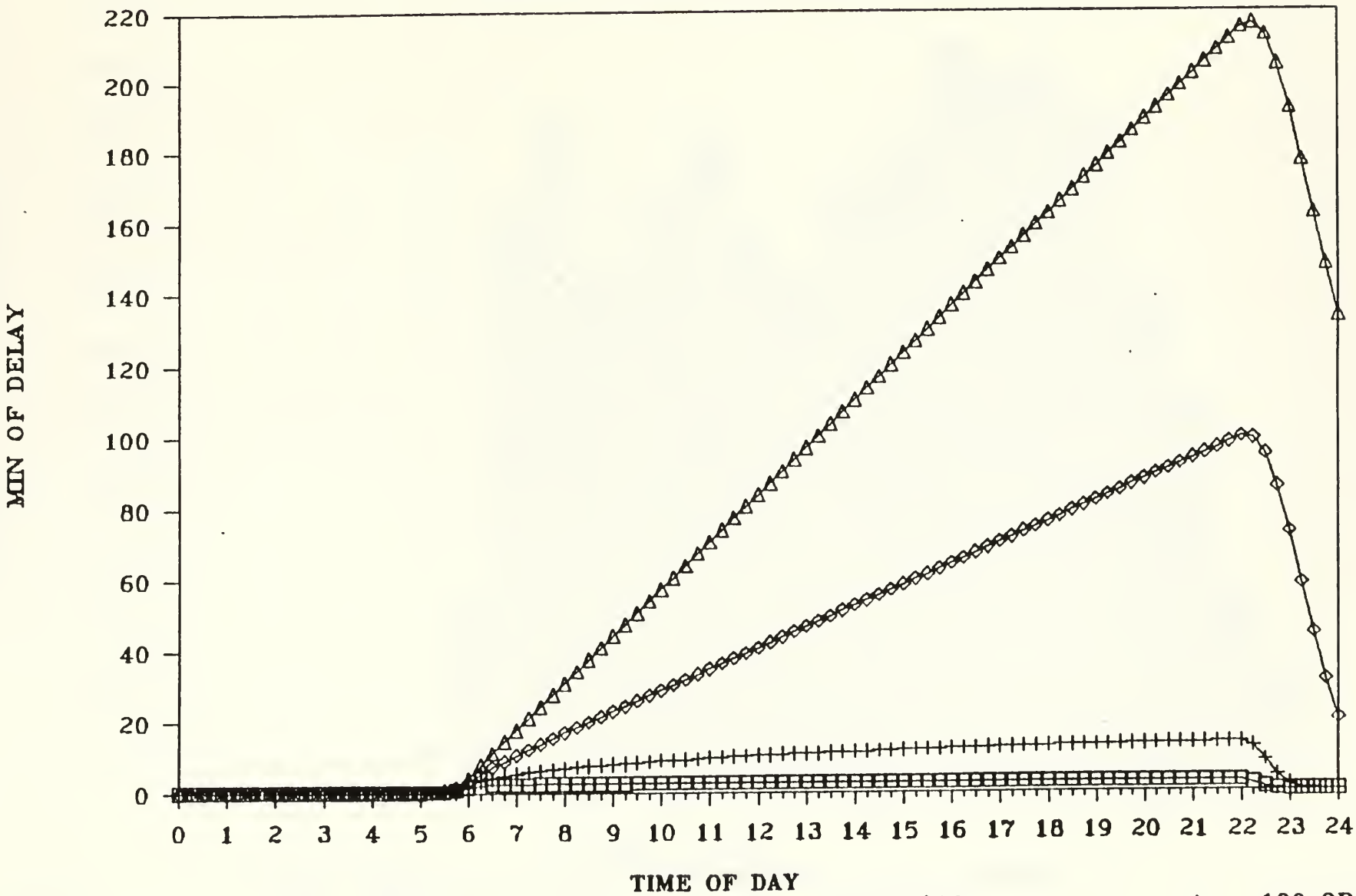


EXHIBIT D

RUNWAY OPERATIONS BY HOUR OF DAY

AVG WEEKDAY - SUMMER, 1987

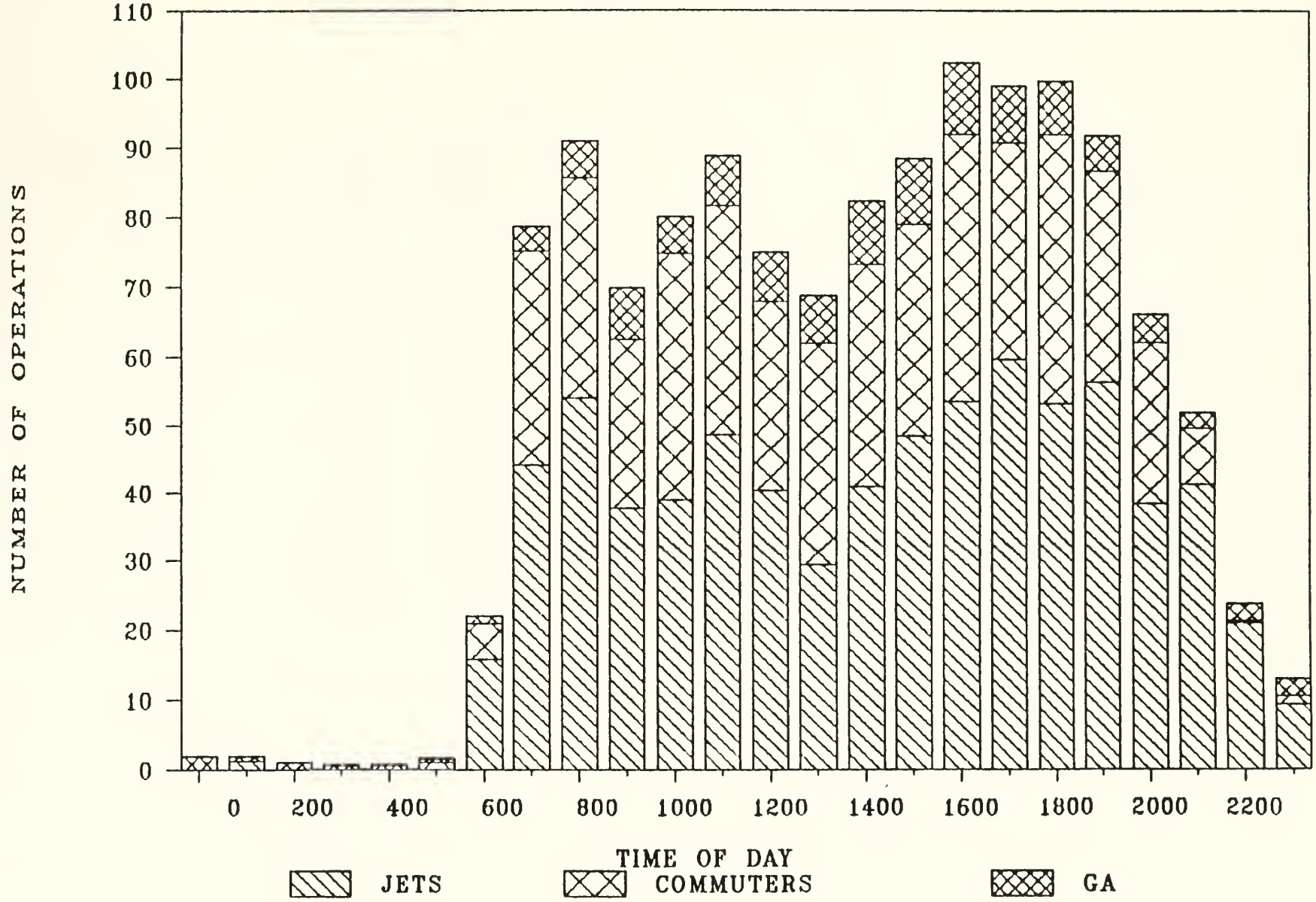


EXHIBIT E

EXHIBIT F

PERCENT OF AVERAGE DAILY OPERATIONS AND PASSENGERS

Practical Capacity:	Percent of Daily Operations Affected: (b)	Percent of Daily Passengers Affected: (c)
100	0.0%	0.0%
95	0.0	0.0
90	0.0	0.0
85	0.1	0.0
80	1.8	0.1
75	4.3	0.3
70	7.4	0.7

NOTES:

a. Average daily operations and passengers include weekday and weekend operations and passengers. Source: August 1987 OAG, and flight strips for general aviation.

b. Includes peak hour operations that are not allocated priority access and which do not obtain reservations in the auction.

c. Includes peak hour passengers on the flights described in (a.) above.

massport

EXHIBIT G

M E M O R A N D U M

To: File
From: Dayl Cohen DAC
Date: October 13, 1987
Re: Methodology for Calculating Landing Fee
Based Upon Equitable Allocation of Costs

The landing fee structure currently used for Logan is that of a charge per thousand pounds of landed weight. The landing fee structure outlined in this memorandum includes a fixed charge per landing plus a variable charge per thousand pounds of landed weight. The basic logic behind this structure is that some of the capital and operating costs of the airfield are actually incurred on a per-landing basis, while others are incurred on a per-landed-weight basis, and these costs should be allocated accordingly.

Each fiscal year, a calculation of the costs of the airfield is performed ("Cost of the Public Aircraft Facilities"), and a landing fee is derived from this calculation and a projection of landed weight for the year to come. For the current analysis, the indiviual elements comprising the "Cost of the Public Aircraft Facilities" calculation for Fiscal Year 1987 were grouped into subcategories of related items. Each subcategory was then assigned to either Weight or Landings, based on the following rationale:

CAPITAL COSTS

Costs Allocated to Landed Weight

(1) Runway Construction and Pavement Maintenance: Runways are designed to meet the physical requirements of a "design aircraft"--the aircraft using the runway which has been identified as requiring the strongest pavement, greatest pavement width, greatest pavement length, etc. For the most part, aircraft weight correlates with well with pavement requirements: the heavier the aircraft, the stronger, wider, etc. the runway should be. This is not absolutely true for each type of aircraft, but within large categories such as jet carrier, commuter, and private General Aviation, the generalization holds. Because the smaller aircraft require fewer cubic feet of pavement, in general, they require less capital investment in pavement. Runway costs have, therefore, been allocated to the weight-based landing fee.

(2) Aprons, Taxiways: The primary costs, here, are for pavement construction and maintenance. For the same reasons

that runway pavement was allocated to landed weight, these other types of airfield pavement are also allocated to landed weight.

(3) Bird Island Flats: We have charged for these improvements based upon weight, and we are currently crediting the carriers for rentals received from BIF tenants based upon weight. It will simplify accounting procedures to continue this practice, and these costs have been assigned to landed weight.

(4) Airfield Land Acquisition and Related Expenses: In general, if larger jets were not landing here, the actual size of the airfield would be smaller. Commuters require runways of only 4000-5000 ft. in length, at most. General Aviation jets require roughly 6000 ft. Logan's runways are between 9000 and 10,000 ft. to accommodate the larger aircraft, and the size of the field with its accompanying clear zones, etc. is directly correlated to the length of the runways. These costs have, therefore, been allocated to landed weight.

Costs Allocated to Landings

(1) Navaids, Field Lighting, and Air Traffic Control: The extent to which navigational aids and Air Traffic Control (ATC) improvements are used depends upon the airplane's instrumentation and not its weight. The need for field lighting is also not related to weight, but to the use of the airfield at night. or in conditions of poor visibility. These capital investments are used on a per operation basis, and are allocated to landings in the landing fee calculation.

(2) Mitigation of Environmental Impacts (Noise and Other): The environmental impact of the airport is caused primarily by the volume of operations. Noise impacts, for example, are not related to aircraft size so much as aircraft technology and cumulative exposure. These costs have been allocated to landings.

(3) Crash/Fire/Rescue: While the nature of and amount of fire and rescue equipment required is related to aircraft size in the Federal Aviation Regulations, it is also related, in the FAA Advisory Circulars, to the number of passenger enplanements--in other words the level of activity at the airport. It is simply a matter of common sense that a very busy airport must have a certain level of equipment to ensure safety, no matter what the size of the aircraft. Further, the risk of aircraft fire is primarily a function of the number of operations the aircraft performs. C/F/R costs have, therefore, been allocated to landings.

(4) General Aviation Facilities: Only GA aircraft use these facilities, but, because they appear in the general landing

fee calculation, the costs are spread among all aircraft landing at Logan. GA landed weight for Fiscal 1987 was approximately 1.5% of the airport total, while GA operations for FY 1987 were 9% of the total. Charging on the basis of landings causes GA aircraft to carry more of the financial load of their own facilities.

(5) General and Administrative Capital Expenditures: The administrative costs referred to are costs associated with the airfield, specifically, and no other part of the airport. The resources required to provide administrative functions for a 7,000 lb. aircraft are not significantly different from those required for a 600,000 lb. aircraft. These costs are allocated to landings.

(6) Capital Cost of Airfield Maintenance: Capital costs associated with this category are primarily associated with upkeep of the Field Maintenance Building, slope protection on the shoreline, and other items that have little to do with the size of the field. Aircraft benefit from these improvements more in proportion to their landings than to their weight, and they have been allocated to landings.

AMORTIZATION, INTEREST AND OPERATING COSTS:

Amortization and Interest

The annual Amortization and Interest charges for the above capital costs are allocated to weight and landings, respectively, in exact proportion to the actual capital costs allocated to weight and landings.

Costs Allocated to Landed Weight

(1) Contract Snow Removal: This cost has been allocated to landed weight because the lighter and smaller aircraft tend to use proportionately less of the apron area which is plowed by the outside contractor.

(2) In-Lieu-of-Tax-Payments: In-lieu-of-tax payments are determined based upon annual passenger enplanements. The share of landed weight for each of the three categories of jet, commuter, and GA is similar to the share of passengers carried by each of these categories. Therefore, these payments have been allocated to landed weight as a reasonable substitute.

(3) Credits Applied: These credits, along with credits from Bird I Rentals (discussed below), are allocated to weight.

(4) Bird Island Flats Rental Credits: Some costs of filling Bird Island Flats appear in the landing fee. Because much of

BIF is used for non-aeronautical purposes, however, the landing fees are credited each year with rentals received from BIF users. The costs have been paid on a landed weight basis for some years, now, and the credits should be applied on the same basis in order to be equitable.

Costs Allocated to Landings

(1) Depreciation of Equipment and Interest on Equipment: Related captital costs, having to do with field maintenance are allocated to landings. It is consistent to allocate these cost to landings, as well.

(2) Maintenance and Operations: While some of these costs might be lower if the airfield covered a smaller area, many of these costs are more attributable to the type and setting of the airfield (on the shorline, largely landfill, etc.) In the case, for example, of snow removal, the whole airfield is not cleared, rather, efforts are concentrated on keeping one runway clear, until the storm passes. Other examples exist to illustrate that these expenses are not incurred in proportion to the size of the field. Therefore, aircraft benefit from these activities in proportion to their use of the airfield--to their landings--rather than in proportion to their weight.

(3) **Administration:** As explained above in the discussion of Administration-related captial costs, these costs are related to operations much more than to landed weight. and have been allocated to landings.

Table 1 shows the total calculation of a fixed fee plus charge per 1000 lbs of landed weight landing fee based upon landings and landed weight from Fiscal Year 1987, and the actual landing fee calculation of costs for Fiscal 1987. The fixed fee per landing comes to $90.59, while the variable fee per thousand pounds equals $0.45.

TABLE ONE

FISCAL 1987 LANDING FEE COMPUTATION:
FEE ALLOCATED BY LANDINGS AND LANDED WEIGHT

ITEM	COST	ALLOCATION CRITERIA	TOTAL COSTS ALLOCATED TO LANDINGS	TOTAL COSTS ALLOCATED TO WEIGHT
CAPITAL COSTS COMPUTATION:				
RUNWAYS-CONSTRUCTION	8,532,309	WEIGHT	$0	$8,532,309
RUNWAYS-PAVEMENT SURFACE MAINTENANCE	20,113,318	WEIGHT	$0	$20,113,318
NAVAIDS AND ATC RELATED EXPENSES	14,424,291	LANDINGS	$14,424,291	$0
APRONS	20,519,430	WEIGHT	$0	$20,519,430
TAXIWAYS	7,123,174	WEIGHT	$0	$7,123,174
BIRD ISLAND FLATS	50,071,192	WEIGHT	$0	$50,071,192
GA TAXIWAY AND APRON	2,848,150	LANDINGS	$2,848,150	$0
FIELD LIGHTING	141,591	LANDINGS	$141,591	$0
AIRFIELD MAINTENANCE AND UPKEEP	3,190,477	LANDINGS	$3,190,477	$0
CRASH/FIRE/RESCUE	1,123,398	LANDINGS	$1,123,398	$0
MITIGATION OF ENVIRONMENTAL IMPACTS				
NOISE	2,012,165	LANDINGS	$2,012,165	$0
OTHER	762,294	LANDINGS	$762,294	$0
AIRFIELD: LAND ACQUISITION AND RELATED EXPENSES	8,813,353	WEIGHT	$0	$8,813,353
GENERAL AND ADMINISTRATIVE CAPITAL EXPENDITURES	5,202,076	LANDINGS	$5,202,076	$0
TOTAL CAPTIAL COST OF THE AIRFIELD	$144,877,218		$29,704,441	$115,172,777
FOR 1 YR (25 YR AMORTIZATION)	$5,795,089		$1,188,178	$4,606,911
FY 1987 LANDING FEE COMPUTATION:				
ANNUAL CAPITAL COST (25 YR AMORT)	$5,795,089	LANDINGS & WT	$1,188,178	$4,606,911
INTEREST				
INTEREST (LANDINGS ALLOCATED)	$1,154,627	LANDINGS	$1,154,627	$0
INTEREST (WEIGHT ALLOCATED)	$4,476,825	WEIGHT	$0	$4,476,825
DEPRECIATION OF EQUIP (10%)	$107,112	LANDINGS	$107,112	$0
INTEREST ON EQUIP (10% AVG. BAL.,10 YRS)	$32,134	LANDINGS	$32,134	$0
MAINTENANCE AND OPERATIONS	$7,926,951	LANDINGS	$7,926,951	$0
ADMINISTRATION	$8,059,615	LANDINGS	$8,059,615	$0
CONTRACT SNOW REMOVAL	$782,375	WEIGHT	$0	$782,375
IN-LIEU-OF-TAX PAYMENTS	$1,896,149	PAX (WEIGHT)	$0	$1,896,149
CREDITS	($1,407,678)	WEIGHT	$0	($1,407,678)
BIF RENTAL CREDITS	($215,736)	WEIGHT	$0	($215,736)
TOTAL FY 1987 COST OF PUBLIC AIRCRAFT FACILITIES	$28,607,462		$18,468,616	$10,138,846
			64.6%	35.4%

* FEE/LANDING: $90.59
* FEE/1000 LBS: $0.45

AIRCRAFT SIZE FOR WHICH FEE
WOULD NOT CHANGE IN FY '87: 97,949 LBS

POTENTIAL PEAK HOUR FARE INCREASES* EXHIBIT H
Selected Markets
---

* Assumes: (1) Entire increase in landing fee is passed on to passengers, and
(2) Average load factor/flight is 70%

A. PORTLAND, ME-BOSTON

Avg. fare = $59.00

Beech 1900 -	19	seats - 13 passengers @ 70% load factor
Weight -	16.6	thousand lbs.
Landing Fee -	$25.00	Current
	$98.48	Projected
Fare Increase -	$2.76	4.7% incr
New Fare -	$61.76	

B. AUGUSTA, ME-BOSTON

Avg. fare = $57.00

Beech 1900 -	19	seats - 13 passengers @ 70% load factor
Weight -	16.6	thousand lbs.
Landing Fee -	$25.00	Current
	$98.48	Projected
Fare Increase -	$2.76	4.8% incr
New Fare -	$59.76	

C. HYANNIS, MA-BOSTON

Avg. fare = $50.00

DC-3 -	30	seats - 21 passengers @ 70% load factor
Weight -	26.3	thousand lbs.
Landing Fee	$35.78	Current
	$102.82	Projected
Fare Increase -	$1.60	3.2% incr
New Fare -	$51.60	

D. MANCHESTER, NH-BOSTON

Avg. fare = $65.00

Beech 99 -	16	seats - 11 passengers @ 70% load factor
Weight -	10.1	thousand lbs.
Landing Fee	$35.78	Current
	$95.54	Projected
Fare Increase -	$2.67	4.1% incr
New Fare -	$67.67	

POTENTIAL PEAK HOUR FARE INCREASES*
Selected Aircraft

EXHIBIT H - 2

* Assumes: (1) Entire increase in landing fee is passed on to passengers, and
(2) Average load factor/flight is 70%

B. BEECH 1900 - 19 SEATS - 13 PASSENGERS @ 70% LOAD FACTOR

Weight -	16.6	thousand lbs.
Landing Fee -	$25.00	Current
	$98.48	Projected
Fare Increase -	$2.76	Per Passenger

C. DC-3 - 30 SEATS - 21 PASSENGERS @ 70% LOAD FACTOR

Weight -	26.3	thousand lbs.
Landing Fee -	$35.78	Current
	$102.82	Projected
Fare Increase -	$1.60	Per Passenger

D. BEECH 99 - 16 SEATS - 11 PASSENGERS @ 70% LOAD FACTOR

Weight -	10.1	thousand lbs.
Landing Fee -	$35.78	Current
	$95.54	Projected
Fare Increase -	$2.67	Per Passenger

E. DASH 7 - 50 SEATS - 35 PASSENGERS @ 70% LOAD FACTOR

Weight -	42.0	thousand lbs.
Landing Fee -	$57.80	Current
	$109.90	Projected
Fare Increase -	$0.74	Per Passenger

OPTION 1

21.24: AIRCRAFT FEES

(1)(a) No operator shall land or take off in an aircraft or otherwise utilize the public airfield facility for operation of an aircraft, except upon payment of fees and charges established in these regulations or otherwise prescribed from time to time by the Authority. Such charges shall include (but not be limited to) a weight-based landing fee payable by each operator using Logan for each landing operation provided that the following minimum landing fee levels shall also apply for each such operation.

(1) For rotary wing aircraft ... $10.00

(2) For fixed wing aircraft ... $91.00

(b) An operator may petition the Executive Director for an exemption to the minimum landing fee levels set forth in Section 21.24(1)(a) for particular aircraft operations which meet the following criteria:

1. The landings for which the exemption is requested must be conducted by an air carrier in the course of providing service pursuant to a certificate issued under 49 U.S.C. sec. 1371 and must have been scheduled by means of publication in the Official Airline Guide; and

2. The landings for which the exemption is requested must have a non-stop flight segment that results in a landing at Logan in a market in which the petitioning carrier is the only carrier providing non-stop scheduled air service; and

3. The non-stop flight segment that results in a landing at Logan must cover a minimum of thirty air-miles to Logan Airport.

(c) To be considered, each petition must be accompanied by sufficient supporting documentation to demonstrate to the satisfaction of the Executive Director that each of the above criteria are met by the operation(s) for which the exemption is sought. Each such petition shall be submitted at least fourteen (14) days in advance of the conduct of the operations for which it is sought, provided, however, that the Executive Director may waive this time requirement for good cause shown.

(d) Any exemption granted by the Executive Director hereunder shall apply to the minimum landing fee levels only and

shall not affect the imposition of a landing fee calculated in accordance with the gross certificated landing weight of the aircraft conducting such landing operation and the applicable weight-based fee then in effect. If an exemption to the minimum landing fee is granted, the exemption shall be limited to two landings per day in the market for which the exemption has been granted and the minimum landing fee shall apply to all other landings within said market.

(e) Each exemption granted hereunder shall be limited in duration by the first to occur of either the commencement of non-stop scheduled service by a second air carrier holding a certificate under 49 U.S.C. sec. 1371 in the exempted market within the exemption period, or ninety (90) days following the conduct of the initial exempted operation. An operator may petition the Executive Director for renewal of an exemption in accordance with the requirements hereunder applicable to the initial period.

(f) In reporting monthly landed weights to the Authority an operator that has been granted an exemption shall identify separately all the landings that occur in the exempted market by flight number, date, time, and aircraft type and shall further identify which of the landings are exempted from the minimum landing fee.

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OPTION 2

21.24: AIRCRAFT FEES

(1)(a) No operator shall land or take off in an aircraft or otherwise utilize the public airfield facility for operation of an aircraft, except upon payment of fees and charges established in these regulations or otherwise prescribed from time to time by the Authority. Such charges shall include (but not be limited to) a weight-based landing fee payable by each operator using Logan for each landing operation provided that the following minimum landing fee levels shall also apply for each such operation.

(1) For rotary wing aircraft.....$10.00

(2) For fixed wing aircraft for landing operations occuring during the periods 7:00 A.M. to 9:00 A.M. and 4:00 P.M. to 6:00 P.M.....$91.00

(3) For fixed wing aircraft operating at all other times.....$50.00

(b) An operator may petition the Executive Director for an exemption to the minimum landing fee levels set forth in Section 21.24(1)(a) for particular aircraft operations which meet the following criteria:

1. The landings for which the exemption is requested must be conducted by an air carrier in the course of providing service pursuant to a certificate issued under 49 U.S.C. sec. 1371 and must have been scheduled by means of publication in the Official Airline Guide; and

2. The landings for which the exemption is requested must have a non-stop flight segment that results in a landing at Logan in a market in which the petitioning carrier is the only carrier providing non-stop scheduled air service; and

3. The non-stop flight segment that results in a landing at Logan must cover a minimum of thirty air-miles to Logan Airport.

(c) To be considered, each petition must be accompanied by sufficient supporting documentation to demonstrate to the satisfaction of the Executive Director that each of the above criteria are met by the operation(s) for which the exemption is sought. Each such petition shall be submitted at least fourteen (14) days in advance of

the conduct of the operations for which it is sought, provided, however, that the Executive Director may waive this time requirement for good cause shown.

(d) Any exemption granted by the Executive Director hereunder shall apply to the minimum landing fee levels only for the operation in question and shall not affect the imposition of a landing fee calculated in accordance with the gross certificated landing weight of the aircraft conducting such landing operation and the applicable weight-based fee then in effect. If an exemption to the minimum landing fee is granted, the exemption shall be limited to two landings per day in the market for which the exemption has been granted and the minimum landing fee shall apply to all other landings within said market.

(e) Each exemption granted hereunder shall be limited in duration by the first to occur of either the commencement of non-stop scheduled service by a second air carrier holding a certificate under 49 U.S.C. sec. 1371 in the exempted market within the exemption period, or ninety (90) days following the conduct of the initial exempted operation. An operator may petition the Executive Director for renewal of an exemption in accordance with the requirements hereunder applicable to the initial period.

(f) In reporting monthly landed weights to the Authority an operator that has been granted an exemption shall identify separately all the landings that occur in the exempted market by flight number, date, time, and aircraft type and shall further identify which of the landings are exempted from the minimum landing fee.

PRESENT LANDING FEE VS PROPOSED FEE

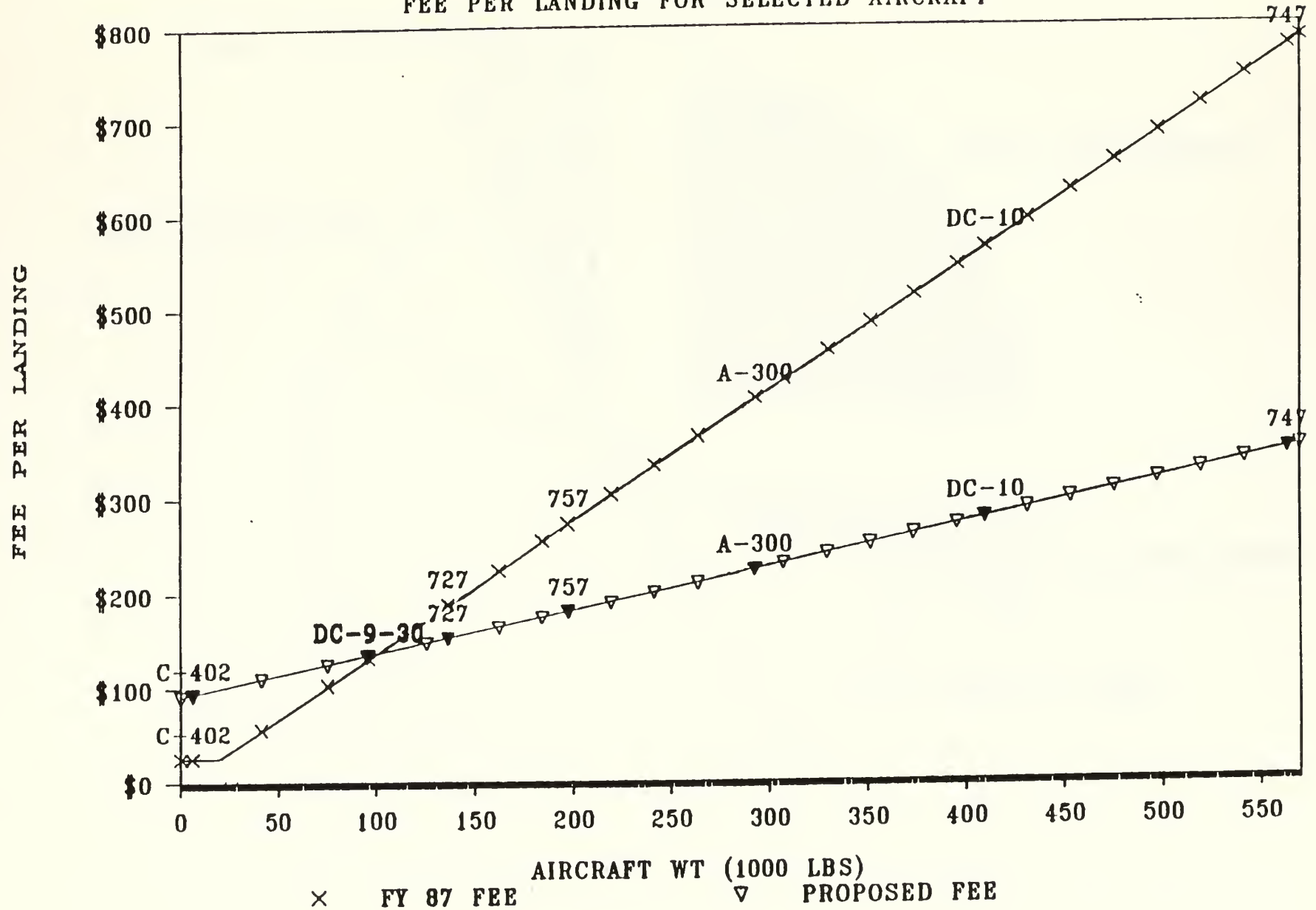


EXHIBIT J

% REDUCTION IN GA AT LOGAN

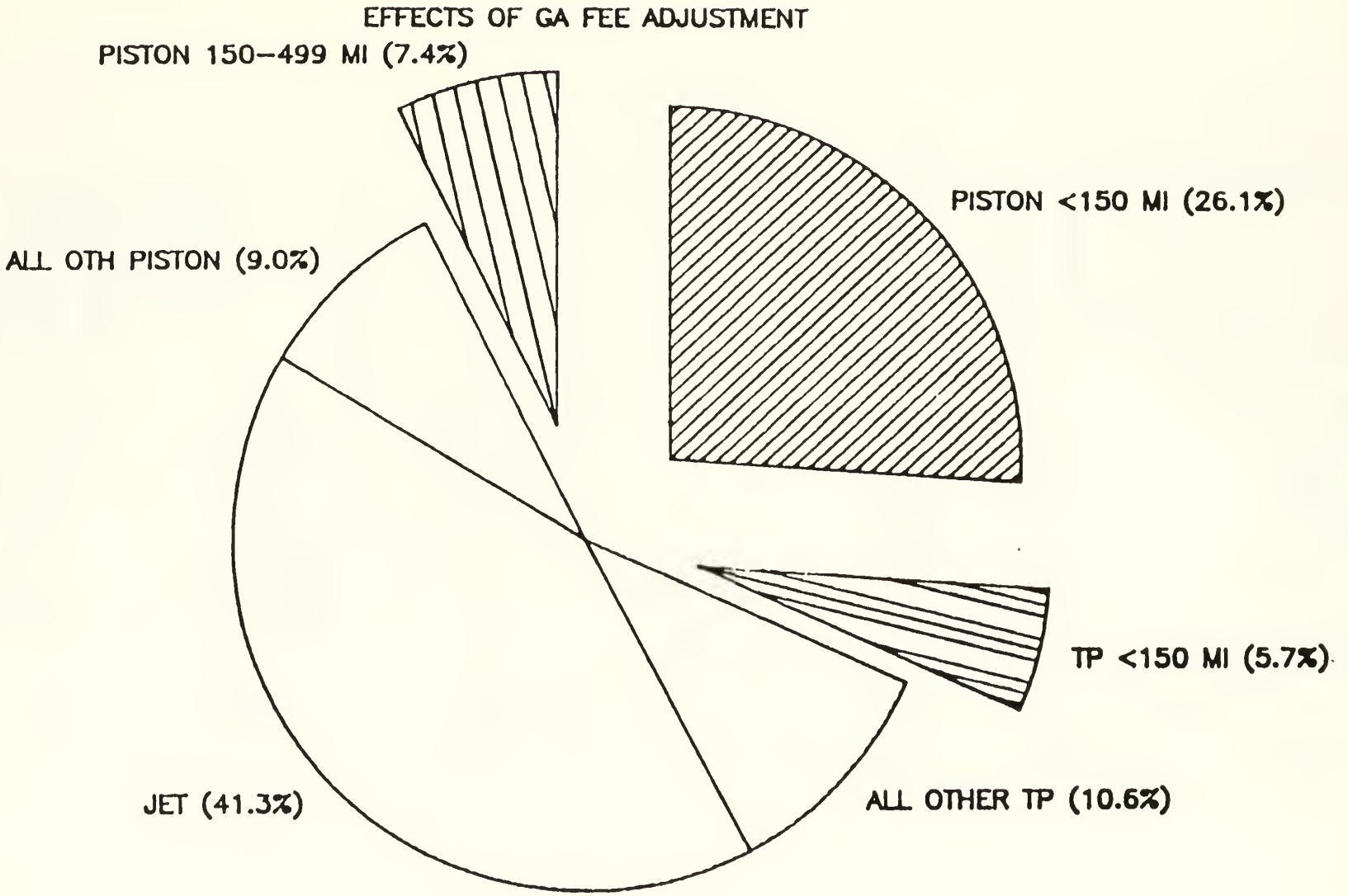
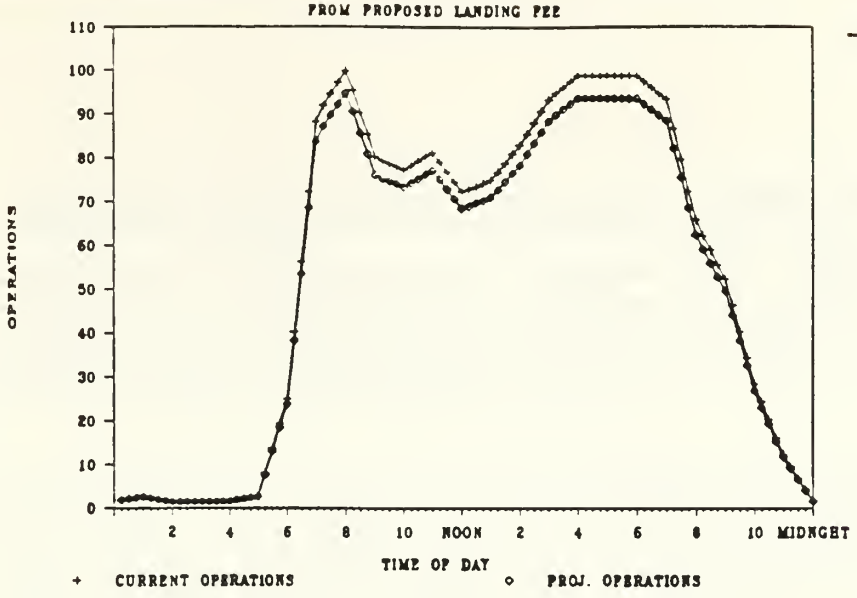


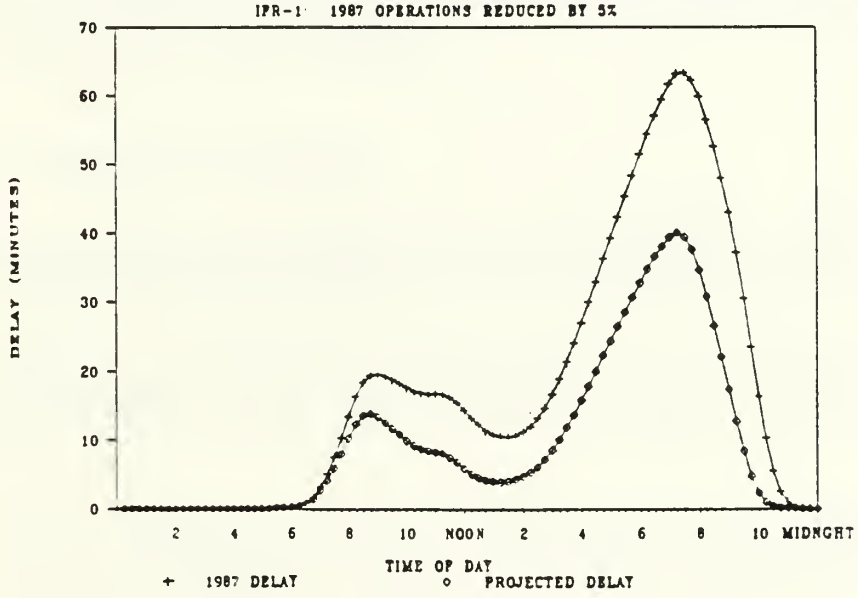
EXHIBIT K

EXHIBIT L

PROJECTED 5% DECREASE IN OPERATIONS



DELAY DECREASE FROM LANDING FEE CHANGE



COMPARISON OF DELAYS IN IFR-1 WEATHER:

	CURRENT OPERATIONS AND CURRENT PEAKS (MINUTES)	DECREASED OPERATIONS DUE TO NEW LANDING FEE STRUCTURE (MINUTES)	PERCENT DECREASE IN DELAY
TOTAL DELAY THROUGHOUT DAY	34,204	18,735	45%
AVERAGE DELAY PER AIRCRAFT	26	15	42%
DELAY EXPERIENCED BY MOST DELAYED AIRCRAFT	64	40	38%
PERCENT OF TOTAL AIRCRAFT DELAYED MORE THAN:			
5 MINUTES	81%	67%	
10 MINUTES	69%	50%	
15 MINUTES	58%	38%	
20 MINUTES	50%	30%	

NOTE: DELAY FIGURES INCLUDED ALL AIRCRAFT TAKING OFF OR LANDING IN AN AVERAGE SUMMER WEEKDAY. IFR-1 WEATHER ASSUMED TO LAST THROUGHOUT ENTIRE DAY.

PRIORITY PEAK HOUR FEE PROCEDURE -- METHODOLOGY

This appendix details the analytical methods that underpin Section IV of the preceding document, which discusses the priority peak hour fee procedure and alternative methods of access. This appendix also presents a simulation of how the priority allocation and auction procedure might actually work.

By adopting the priority peak hour fee procedure combined with related landing fees at Logan International Airport, Massport would seek to limit the congestion and delays experienced by aircraft and passengers during peak hours, both now and in the future. The proposed priority peak hour fee prodecure and associated fees would encourage aircraft operators at Logan to use larger, more productive aircraft during peak hours, and would redistribute marginal flights made by less productive aircraft to off-peak hours, when additional operations can be accommodated without producing serious delays.

SUMMARY OF SIMULATION RESULTS

The purpose of the simulation was to test whether the objectives of the proposed priority peak hour fee procedure could be achieved without excessive disruptions to air passenger flow.

In the simulation, the priority peak hour fee procedure was applied within the structure of a hypothetical maximum limit of 80 operations per hour, which was found to affect only a small share of daily flights:

-- 1,011 flights, or 91% of the expected 1,120 daily flights would have been able to operate as originally planned, because they would either have been scheduled for off-peak hours, or they would have qualified for priority operating permission during a peak hour.

-- Another 89 flights, or 8% of the expected daily flights, would have bid peak hour fees in the auction.

-- Only 20 flights, or 1% of the 1,120 daily flights, would not have been accommodated via the auction. The operators of these 16 flights would not necessarily have discontinued or cancelled the flights, because they would have been able to choose among the additional methods of access available to them. They might have decided to reschedule to an off-peak hour, pay peak hour premium fees to operate non-priority flights during peak hours, upgrade to larger priority sized aircraft, or operate out

of an alternate airport instead of using Logan International Airport. Some of these flights might have been permitted to use Logan under Massport's proposed exemption program for certain essential air service.

Based on the simulation, the priority peak hour fee procedure would have been able to achieve its objectives with a minumum of disruption for two reasons. First, the procedure would have been in effect for only five out of the eighteen hours a day when operations generally occur at Logan. The number of flights originally planned for the four hours between 4:00 pm and 8:00 pm would have exceeded Logan's practical capacity (assumed to be 80 operations in the simulation), so those four peak hours would have been governed by the priority peak hour procedure. Excess flights rescheduled from the 4:00 pm hour to the 3:00 pm hour would have pushed the 3:00 pm hour over Logan's practical capacity, so that peak hour would also have been governed by the priority reservation procedure.

The second reason for the success of the priority peak hour fee procedure is that the majority of flights during the five peak hours would operate under the same fee conditions now in existence at Logan.

Revenues from the auction and the payment of peak hour premiums would have constituted only a small percentage of the total revenues required to cover Massport's airfield costs. In the simulation, the auction was estimated to realize revenues of approximately $610,000 during the six-month period. On an annual basis, revenues from the auction would only constitute 4% of the $30 million required to cover airfield costs in Fiscal Year 1988. The peak hour premiums were assumed to be high enough in the simulation that the 1% of airport users who might have considered this option would have decided against it. Revenues from the peak hour premiums were therefore assumed to be negligible.

SIMULATION METHODOLOGY

A spreadsheet model simulated the process of defining peak hours, allocating priority flights during peak hours, determining the peak hour fee at auction, and providing additional methods of airport access.

Logan's Practical Capacity

In practice, Massport would hold discussions with FAA and DOT to establish a figure that accurately represents Logan's practical capacity. A practical capacity of 80 operations per hour was used in the simulation, for several reasons. Analysis of existing delay patterns at Logan indicates that in less than ideal weather conditions (IFR1), delays increase sharply once the number of hourly operations exceeds 80, especially when there are more than 80 operations during each of several hours in a row.

Aircraft operating during or immediately following hours with over 80 operations are estimated to experience delays of between 10 and 35 minutes per aircraft. The length of the delay depends on how many consecutive hours of over 80 operations the airport has already experienced that day.

Finally, a level of between 70 and 90 operations per hour at Logan Airport would accommodate Massport's projected future demand at average delay levels that are no worse than those occurring today, provided those operations were distributed fairly evenly throughout the day.

Expected Flight Activity

Users of the airport would normally file their expected scheduled activities in advance of a six-month period. This analysis used average hourly flight activity data from August of 1987, which is a peak month for scheduled activity at Logan. Massport would normally add an additional increment of operations to the expected scheduled flight activity, to account for the number of general aviation and non-scheduled flights projected for each hour based on historic demand data. The simulation used data from March of 1987, which is a peak month for general aviation activity. The combined data for scheduled and non-scheduled activity is broken down by aircraft type, and shows the number of flights each hour during an average day of a busy month.

The total number of flights expected each hour was compared to Logan's practical capacity of 80 operations. Only the four hours between 4:00 p.m. and 8:00 p.m. exceeded 80 operations per hour. Operations during these peak hours would have been governed by the priority peak hour fee procedure, as described below.

During the remaining fourteen hours out of the eighteen hours when operations generally occur at Logan, any flight consistent with existing Airport rules and regulations would have been able to operate at the airport.

Priority Peak Hour Fee Procedure

Under the priority peak hour fee procedure, any operation that occurs during a peak hour would either qualify for priority allocation without a peak hour fee or it would be required to pay an auction related peak hour bid value. Operators of flights not having a priority allocation could compete in the auction for a peak hour fee at Logan during a given hour of each day over a six-month period.

- Priority Flights

During peak hours, the priority peak hour fee procedure would give certain flights priority over others based upon their passenger carrying capacity, as described below. These priority flights would be conducted without a peak hour fee.

In the simulation, flights expected during peak hours were ranked in terms of the number of passengers each aircraft could carry. The greater the number of passengers that could be accommodated on a flight, the higher its ranking. (Cargo flights were treated according to how many passengers each aircraft could carry if it had been configured for passengers instead of cargo.)

So that aircraft of comparable size would be treated alike, regardless of carrier or market, the flights were then grouped into eight aircraft size groups:

Aircraft Group:	Aircraft Size:	Example of Aircraft Types:
Group 1	Over 300 seats	747
Group 2	225-300 seats	L1011, DC10, Airbus 300
Group 3	175-225 seats	DC8-70 Series, 767, 757
Group 4	125-175 seats	MD80, 737-300, 727-200
Group 5	100-125 seats	DC9-30, 737-200, 727
Group 6	75-100 seats	DC9, B11
Group 7	30- 75 seats	Shorts 360, F28, Dash 7
Group 8	Under 30 seats	Cessna Citation, Beech 99

Under the priority peak hour fee procedure, a certain percentage (the allocation threshold) of Logan's practical capacity would be assigned to priority flights. This percentage would normally be established in discussions with FAA and DOT. In the simulation, it was assumed that 85% of Logan's hypothetical practical capacity of 80 hourly flights would be given this priority status, so the threshold number was 68 flights.

The process of assigning priority was simulated for each peak hour by beginning with the largest aircraft size group, and allocating priority status on a group-by-group basis until no more than 68 flights (the 85th percentile) had been granted priority status. Where one group brought the total to less than 68 flights and the next exceeded that threshold, the first group was granted priority status, and the next was not.

The result of the simulation was that in each peak hour, flights by aircraft in Groups 1 to 7 were designated as priority flights, while those in Group 8 were defined as non-priority flights. This

means that all priority flights by aircraft of 30 or more seats would have been allowed to operate without the need to participate in the peak hour fee auction, while non-priority flights by aircraft with less than 30 seats could choose among the other alternatives discussed below.

- Peak Hour Fee Auction

The priority peak hour fee system would allow flights that are not identified as priority flights to try to bid for peak hour fee by participating in an auction for Logan's remaining practical capacity. The number of flights available at the auction for each peak hour would equal Logan's practical capacity, less the number of priority flights identified for each priority hour.

Auctions would be held several months before the beginning of each six-month season. Sealed bids would be submitted by any interested party, and the remaining number of flights would be awarded to the highest bidders, bringing the total number of flights up to Logan's practical capacity.

Individual general aviation aircraft operators would be unlikely to bid on peak hour fees for every day of the six-month season. Organizations such as the Aircraft Owners' and Pilots Association (AOPA), the National Business Aircraft Association (NBAA), or Logan's fixed base operators could, if they wished, be allowed to act as general aviation agents to ensure the availability of some peak hour access at below premium prices. These general aviation agents could, if interested in providing this service for their constituents or clients, bid for the number of peak hour flights that they felt were required, then sell the permission to use the bid fees on a per-operation basis to individual general aviation users.

In the simulation, approximately $610,000 would have been paid by operators who would have submitted winning bids to Massport for peak hour fees covering a six-month period. On an annual basis, revenues from this auction would constitute only about 4% of the total Massport would receive to cover airfield costs in Fiscal Year 1988.

The priority peak hour fee procedure would provide users of Logan with two methods of gaining access to Logan in peak hours under existing landing fees. The approach would give priority access to those users who fly the most productive aircraft. It would also provide access to those among the remaining operators who place a high enough economic value on their use of Logan during peak hours that they would be willing to bid fees at the auction.

Ninety-one percent of the daily flights in the simulation would have been allowed to operate as originally planned. These flights would either have taken place during off-peak hours, or they would have qualified for operating priority during a peak hour. An additional eight percent of the total daily flights would have

been accommodated through the auction, bringing the total number of flights operating during peak hours up to Logan's practical capacity.

Operators of the remaining one percent of daily flights would have originally planned to operate during hours that had since been designated peak hours. Thirteen of these 16 flights would have been planned by general aviation users, and the other three flights would have been planned by commuters. They would have been planning to fly small aircraft with an average of 15 seats, aircraft that would have been too small to qualify for priority to operate. These operators would not have bid a sufficient peak hour fee in the auction; they would either have chosen not to submit a bid, or they would not have submitted a high enough bid to qualify.

Operators of these remaining 16 flights would have had a variety of alternatives amongst which to choose. In order to operate at Logan, they could pay peak hour premiums, upgrade to larger aircraft, or reschedule flights to off-peak hours. Each of these alternatives is discussed in more detail below.

Some of these remaining flights might have been permitted to use Logan during peak hours under Massport's proposed exemption program for certain essential air service. In order to accommodate such service by small, non-priority aircraft, Massport would set aside a certain number of reservations from the practical capacity. Massport would also waive priority peak hour fee procedures and requirements for aircraft in distress, and for other emergency situations.

Alternatively, operators of the remaining 16 flights might decide not to operate out of Logan. They could decide to fly out of other airports in the area, including Hanscom Field, which is another airport operated by Massport located 15 miles northwest of Boston in Bedford, Massachusetts. Some of these operators could decide to cancel or discontinue certain flights that had been planned for hours that were subsequently designated peak hours at Logan. They might cancel or discontinue those flights, after making other peak hour flights to the same destination more productive, or after deciding that certain peak hour flights were not necessary.

Peak Hour Premium Fee

Under the priority peak hour fee procedure, operators of non-priority flights who choose to land or take off at Logan during peak hours, without successfully bidding at the auction, would pay a substantially higher price (on a per-use basis) for using Logan at that time. The peak hour premium fee would be equal to the highest auction price for that priority hour, calculated on a per-use basis, plus a substantial premium.

In the simulation, it was assumed that the peak hour premium fees would be large enough to deter operators of non-priority flights from using the airport during peak hours if they had not bid a peak hour fee in the auction. This would help to ensure that the number of flights that would actually have taken place during peak hours would have exceeded Logan's practical capacity slightly, if at all. It would also help to ensure that those "excess" flights would have been made by operators with a strong economic need to use the airport, who would have been willing to pay to use the airport during peak hours.

Upgrade to Larger Aircraft

Those operators of non-priority flights not willing to pay the necessary auction fees or peak hour premium fees could decide to use larger aircraft than they had originally planned, aircraft large enough to qualify for the priority allocation during a peak hour. It happens that in the simulation, the allocation threshold for each peak hour fell between groups of aircraft with less than 30 seats and those with 30 or more. Therefore, operations conducted during peak hours in aircraft of over 30 seats would have qualified for a priority to use the airport without participating in an auction.

If operators had resized to larger aircraft after Logan's practical capacity had already been reached, then any "upgraded" flight would have pushed the total number of flights over the practical capacity. This would have increased the number of flights somewhat during a given hour, potentially causing an increase in the delays experienced by all aircraft flying during that hour. But gaining access by upgrading to larger aircraft would have meant that air service would have been provided for many more passengers (or more cargo) than if the original flight had been allowed to operate with a smaller aircraft, or if the flight had been prohibited from operating at all.
This upgrade could include the consolidation of a number of flights in smaller aircraft in the peak or other hours.

Reschedule Flights

Operators of non-priority flights that were originally planned for hours that subsequently became peak hours could decide to reschedule those flights to adjacent off-peak hours. They could thus avoid the extra cost of paying auctioned peak hour fees or paying peak hour premium fees.

It was assumed that operators would not likely reschedule flights by more than one hour. If adjacent hours were unable to accommodate them, then flights that could not obtain operating permission during peak hours, and whose operators chose not to pay auction fees or peak hour premium fees, or to upgrade to larger aircraft, would have been rerouted to another airport or discontinued. As mentioned above, Massport might exempt certain

flights by small aircraft providing essential air service, and would allow aircraft to land if they were in emergency situations.

Flight rescheduling was simulated according to the following rules, to reflect how operators might actually reschedule flights:

* If a peak hour falls between two off-peak hours, then half of the excess flights from the peak hour move up an hour, and the other half move back an hour.

* If there are two or more peak hours in a row, then all of the excess flights from the first peak hour move up an hour, and all of the excess flights from the second peak hour move back an hour.

* If there are more than two peak hours in a row, then the excess flights from middle hours that are bounded by other peak hours would most likely be upgraded, rerouted, or discontinued, since their operators are not likely to move them more than an hour.

In the simulation, eight excess flights from the 4:00 p.m. peak hour would have been candidates to be rescheduled to the 3:00 p.m. off-peak hour. Once four of those flights were rescheduled, the 3:00 hour would have reached Logan's practical capacity of 80 flights. The 3:00 hour would therefore have been treated as a peak hour, with 54 aircraft of 30 or more seats qualifying for priority allocation. Operators of non-priority flights by aircraft with less than 30 seats would have been able to compete for the 26 remaining allowable flights by participating in the auction.

MID-SEASON ADDITIONS AND ADJUSTMENTS

The priority peak hour fee procedure would also allow for airline schedule changes, extra section flights, and charter flights, none of which may be anticipated before the beginning of a six-month period.

Under the procedure, operations conducted during a peak hour, in aircraft that are in one of the priority aircraft groups, would be free to operate at the airport without successfully bidding for a peak hour fee. Therefore, airlines would be free to make schedule changes during a six-month period, provided they used aircraft in a priority aircraft group. Airlines could also add extra sections to existing flights, such as shuttle flights.

Charter operators would not make regularly scheduled flights every day over the course of an entire six-month period. The priority procedure would allow charter flights to operate during peak hours, provided aircraft in a priority aircraft group were used.

Changes of this sort were not included in the simulation, because they are unanticipated. Schedule changes might have reduced or

increased demand during certain hours, depending on what changes were made. Extra section airline flights and charter flights added during peak hours would have pushed the total number of flights during those hours over Logan's practical capacity. However, the additional air service provided for large numbers of passengers or greater amounts of cargo by these large aircraft should be considered, as well as the the increase in delays due to the introduction of these new flights.

SPREADSHEET MODEL

The attached spreadsheet model was used to simulate the priority peak hour fee procedure. The first page of the model presents the assumptions that were made regarding Logan's practical capacity, the percent of hourly flights that would be required to bid peak hour fees at the auction, and the percent reduction in general aviation activity that might result from the restructured landing fee and general aviation terminal fee. Assumptions regarding these variables can easily be changed in the model.

Average daily flight data for several busy months in 1987 is shown for each of the eight aircraft size groups. The data shows both the number of arrivals and departures by aircraft group and the cumulative operations for each hour, beginning with the largest aircraft size group. The spreadsheet also shows the allocation threshold, and the number of priority flights in each peak hour.

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EXHIBIT M - 10

HOURLY AND CUMULATIVE PASSENGER FLIGHT ARRIVALS AND DEPARTURES BY AIRCRAFT GROUP

Variables selected were:

Practical Capacity (flts)	80
% in Auction:	15%
% Reduction in GA: (Restructured Landing Fee)	40%

PASSENGER FLIGHT ARRIVALS AND DEPARTURES BY HOURLY PERIODS: (a)

Aircraft Group:	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	TOTAL
Group 1 300+ Seats	0	0	0	0	0	0	0	1	0	1	2	0	3	1	2	1	0	0	
Group 2 225-300 Seats	1	8	8	2	3	3	3	5	5	5	4	8	8	6	7	9	1	1	
Group 3 175-225 Seats	2	5	7	4	4	4	4	2	4	9	4	5	4	3	5	3	4	1	
Group 4 125-175 Seats	9	17	18	14	16	24	21	12	19	20	26	26	15	27	12	16	9	6	
Group 5 100-125 Seats	2	6	12	10	11	11	7	5	7	7	12	12	11	13	8	7	4	0	
Group 6 75-100 Seats	0	2	1	2	1	1	1	1	0	0	0	3	3	0	0	1	0	0	
Group 7 30-70 Seats	2	10	16	10	15	10	9	12	14	12	16	11	19	13	8	3	0	1	
Group 8 Under 30 Seats	3	19	18	18	18	25	20	21	21	21	25	21	24	17	16	7	2	2	
TOTAL	19	69	79	59	70	77	64	59	70	76	88	86	87	80	58	46	20	11	1120

CUMULATIVE PASSENGER FLIGHT ARRIVALS AND DEPARTURES BY HOURLY PERIODS: (a)

Aircraft Group:	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	TOTAL
Group 1 300+ Seats	0	0	0	0	0	0	0	1	0	1	2	0	3	1	2	1	0	0	
Group 2 225-300 Seats	1	8	8	2	3	3	3	6	5	6	6	8	11	7	9	10	1	1	
Group 3 175-225 Seats	3	13	14	6	7	7	7	8	9	15	10	13	15	10	15	13	5	2	
Group 4 125-175 Seats	12	30	32	20	23	31	27	20	28	36	36	39	30	37	26	28	14	8	
Group 5 100-125 Seats	14	37	45	30	33	42	35	25	35	42	48	51	41	50	34	35	19	8	
Group 6 75-100 Seats	14	39	46	32	34	42	36	26	35	42	48	53	44	50	34	36	19	8	
Group 7 30-70 Seats	16	49	61	41	52	52	45	38	50	54	63	64	63	63	42	39	19	9	
Group 8 Under 30 Seats	19	69	79	59	70	77	64	59	70	76	88	86	87	80	58	46	20	11	
TOTAL	19	69	79	59	70	77	64	59	70	76	88	86	87	80	58	46	20	11	1120

Allocation Threshold is: 88 Flights during priority hrs of 80 or more flights.
(May fall w/in groups)

Priority Flights:	0	0	0	0	0	0	0	0	0	0	63	64	63	63	0	0	0	0

NOTES:

a. Average daily flight data for the months of March and August, 1987.

PRIORITY ACCESS RESERVATION PROCEDURE

Rang

Variables selected were:

Practical Capacity (flts)	80
% in Auction:	15%
% Reduction in GA: (Restructured Landing Fee)	40%

Results:

	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	%
Expected Flight Demand: (a)	19	69	79	59	70	77	64	59	70	76	88	86	87	80	58	46	20	11	1120	
Flights Accomodated Before Peak Hour Flight Rescheduling:																				
Off-Peak Hour Flights:	19	69	79	59	70	77	64	59	70	76	0	0	0	0	58	46	20	11	779	
Priority Flights:	0	0	0	0	0	0	0	0	0	0	63	64	63	63	0	0	0	0	253	
Auctioned Reservations:	0	0	0	0	0	0	0	0	0	0	17	16	17	17	0	0	0	0	67	
Sub-Total:	19	69	79	59	70	77	64	59	70	76	80	80	80	80	58	46	20	11	1099	
Excess Peak Hour Flt Demand:	0	0	0	0	0	0	0	0	0	0	8	6	7	0	0	0	0	0	21	
Excess Peak Hour Flights Rescheduled to Available Hours:																				
Off-Peak Hour Flights:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Auctioned Reservations:	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0% (c)
Sub-Total:	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0% (c)
Total Flights Accomodated:																				
Off-Peak Hour Flights:	19	69	79	59	70	77	64	59	70	0	0	0	0	0	58	46	20	11	704	63%
Priority Flights:	0	0	0	0	0	0	0	0	0	54	63	64	63	63	0	0	0	0	307	28%
Auctioned Reservations:	0	0	0	0	0	0	0	0	0	26	17	16	17	17	0	0	0	0	93	8%
TOTAL:	19	69	79	59	70	77	64	59	70	80	80	80	80	80	58	46	20	11	1104	99%
Remaining Flights: (b)	0	0	0	0	0	0	0	0	0	3	0	6	7	0	0	0	0	0	16	1%
																		TOTAL DEMAND:	1120	100%

NOTES:

a. See attached passenger flight arrival and departure data.

b. Remaining flights are from peak hours. They could be upgraded to larger aircraft, they could pay for preclue reservations, or they could be rerouted, discontinued or cancelled.

c. Less than .5%.